

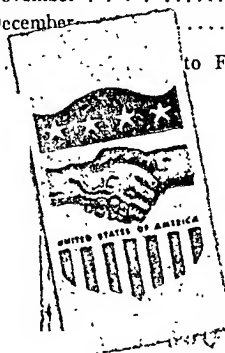
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The National Health Conference and the Future of Public Health *

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NO speaker on the special program arranged for this afternoon can be insensible to the honor accorded him. Each of us is aware that the American Public Health Association is meeting this year under unusual circumstances. In the sixty-six years since the founding of this Association, there probably never has been a time when there was such great opportunity and such broad responsibility confronting the public health professions. It is probable that the National Health Conference, held last July, marked a turning point in the health program of the nation. This special meeting provides an occasion to take stock of the proposals suggested at that conference as signposts to the future of public health.

It would be presumptuous for me to address the American Public Health Association in the guise of a public health expert. My rôle is to lay before

you the tentative conclusions reached by a group of technical experts in the federal government and to outline the significance of these findings, as they appear to me and to my colleagues.

Public health has long been recognized as fundamental for the public welfare. But this principle has been honored in the breach as well as in the observance. As our society becomes increasingly complex, health is vitally important to the nation as a whole just as it is vitally important to the individual and the family. As our society changes, health needs change; and health services must adjust themselves accordingly. The essential change which is occurring—and even the most casual observer can see it—is the development of an ever closer focus of the health services upon the economic and social welfare of the family. The National Health Conference recently held in Washington was a logical outcome of this trend. I want to review for you the program discussed at that Conference and to consider briefly its significance to the public health professions.

* Read at a Special Session on Public Health Aspects of Medical Care of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 26, 1938.

THE INTERDEPARTMENTAL COMMITTEE

The background of the National Health Conference is briefly told. Immediately after the passage of the Social Security Act in August, 1935, President Roosevelt recognized that many health and welfare activities then considered to be of an emergency nature were likely to become permanent, and that administration of the newly established responsibilities of government should be effectively coördinated. He therefore created the Interdepartmental Committee to Coördinate Health and Welfare Activities. The chairman of that committee is Josephine Roche, LL.D., formerly Assistant Secretary of the Treasury; the other members are the Under Secretary of Agriculture, the Assistant Secretaries of the Interior and Labor, and myself. This committee undertook to explore its problems through a number of technical committees, one of which is the Technical Committee on Medical Care. This subcommittee is composed of representatives from the U. S. Public Health Service, the U. S. Children's Bureau, and the Social Security Board.

The Technical Committee on Medical Care made extensive studies of the health practices and of the needs of the country. It summarized its findings in a report entitled "The Need for a National Health Program." On February 14, 1938, this report was presented to the Interdepartmental Committee which approved it and submitted it to the President.

The President recognized the urgency of the needs described in the report of the Technical Committee and suggested that the Interdepartmental Committee lay the Technical Committee's report—including its recommendations—before a public conference. Miss Roche called the National Health Conference in Washington in July to analyze the problems and to discuss the recommendations of the Technical Committee. Some

of you attended the Conference; all of you know about it in a general way. I intend, therefore, only to summarize briefly the recommendations made by the Technical Committee at that time, giving special attention in this review to those aspects of the recommendations which are of special concern to you.

TECHNICAL COMMITTEE'S RECOMMENDATIONS

The committee presented five recommendations for discussion—and, at the outset, let me emphasize these were *recommendations* only. No resolutions were passed at the National Health Conference; no program was voted upon. Action will come later, when and if the citizens of this country initiate it through their legislative representatives.

The first recommendation was that the existing federal-state coöperative program for general public health services and for maternal and child health services, both recently strengthened under the Social Security Act, be further extended through enlarged grants-in-aid to the states.

Under this recommendation, the committee first proposed an expansion of general public health services. Prevention must always be regarded as the first step in a health program. Expansion of preventive health services means the strengthening and extension of organized public health services which are furnished primarily in the states and in the local communities. Federal participation in the existing coöperative program, developed under title VI of the Social Security Act; should be increased with a view toward equalizing the public health services throughout the nation by strengthening these services where they are weak. The committee further proposed that increased federal participation be used particularly in promoting an attack on certain important causes of sickness and death for the control of which we already have effective weapons.

It has long been an accepted maxim that public health is purchasable, but it has also long been the practice that we do not really purchase it. If we want effective public health service, we must really want it and must be prepared to pay for it.

The rate at which the program can be developed depends upon many factors, involving the states, the local communities, and voluntary agencies, as well as the federal government. The rate of expansion must be geared to the development of administrative and coöperative organization and to the availability of trained and experienced personnel. The committee's recommendation called for a careful but steady expansion toward a 10 year goal when an adequate program of expanded public health services would require additional expenditures by federal, state, and local governments of about \$200,000,000 a year—that is, about \$1.50 per capita.

The second part of the first recommendation deals with the expansion of special maternal and child health services. The committee proposed an expansion of the federal-state coöperative program already developed under title V of the Social Security Act. The goal is to assure to mothers and children of all income groups and in all parts of the United States at least those minimum medical services which are essential to reduce our needlessly high maternal mortality rates and death rates among new-born infants, and to prevent diseases and conditions which occur in childhood and lead to serious disabilities in later life. The committee's recommendation calls for a gradually expanding program and this will cost money. If all that should be undertaken were brought into practice, the program would require, by the 10th year, total additional expenditures of about \$165,000,000 a year or about \$1.25 per capita.

The committee recommended that approximately one-half of these increased funds be provided by the federal government.

Expressed in millions of dollars, the costs involved in this first recommendation seem large—an eventual \$365,000,000 per annum. But when related to the expanding population in the 10 years for which the program is laid out, the total comes to about \$2.75 per person per year.

The second recommendation was concerned with federal grants-in-aid for the construction of needed hospitals and for provision of temporary maintenance grants in the first 3 years after these new hospitals are built, in order to assist the local communities in taking over the responsibility for using and supporting them.

The committee's study showed that we need about 360,000 additional beds—taking into account beds needed in general, tuberculosis, and mental disease hospitals in both rural and urban areas—and that we need at least 500 health and diagnostic centers in areas not readily accessible to hospitals or not sufficiently populated to require or to be able to support fully equipped hospitals. Improvement and modernization of existing facilities is, of course, included. Averaged over a 10 year period, the total annual cost of this program, including both construction and temporary maintenance, is estimated at a little under \$150,000,000, of which about one-half should be met by the federal government.

The committee pointed out, of course, that construction of new hospitals would be an unwise procedure if there were not, at the same time, provision to help meet the costs of hospital care. Otherwise, the new hospitals, as well as many of the existing hospitals, would still be unavailable to the poor and to people with small incomes; the net result would be more empty hospital beds and

continuing inadequate service. The third and fourth recommendations of the committee deal with this problem.

The third recommendation called for federal grants-in-aid to the states to help them meet the costs of a medical care program for recipients of relief or public assistance and for other persons with low incomes who are able to meet the ordinary costs of living but not the extraordinary costs of illness.

The facts brought to the attention of the committee show that the one-third of the population which is in the lower income levels is receiving inadequate general medical services. This applies to more than 20,000,000 persons who are supported by general relief, work relief, old-age assistance, or other forms of public aid; and to about 20,000,000 other persons in families with incomes of \$800 a year or less. These 40,000,000 people are doubly handicapped. They have higher rates of sickness and disablement than prevail among groups with larger incomes, and they have lesser capacities to buy and pay for the services they need. Current provisions for medical services are inadequate to meet their needs. The committee recommended that the federal government assist the states through grants-in-aid to strengthen medical services for these two broad groups of the population.

It is estimated that, on the average, \$10 a year per person in the groups to be aided would be required to meet the minimum needs for essential medical and surgical care, diagnostic services, hospitalization, medicines and appliances, and emergency dentistry. The use of governmental hospitals in communities where they are available is, of course, assumed. The use of non-governmental hospitals, paid for on a proper basis by public funds, is also assumed as a part of this program wherever local conditions make this policy necessary or expedient. Thus, a strengthened program of public medical services for

medically needy persons would help to make use of existing hospital beds, and also of newly constructed hospital beds where the facilities are inadequate, and would help to meet the costs of hospital services for these medically needy persons. This also applies to the use of out-patient clinics and similar facilities.

This part of the program might be begun with the expenditure of \$50,000,000 the first year and gradually expanded until it reaches the estimated level of \$400,000,000 which would be needed to provide minimum care at an average cost of \$10 per person a year to the 40,000,000 medically needy people. The committee recommended that one-half of the total annual cost be met by the federal government.

The fourth recommendation was presented as complementary to the third and called for grants-in-aid to states to enable them to set up a general program of medical care, either by the use of taxation, or by state health insurance programs, or by a combination of the two.

The first three recommendations, you will note, took account of general or special preventive services, hospital construction and modernization, and services for the medically needy. This fourth recommendation turns to the problems of persons who are ordinarily self-supporting. The committee directed attention to the economic burdens created by sickness, especially among low-income groups, and concluded that there is need for measures which will enable people to anticipate and to meet sickness costs on a budget basis.

Without great increase in total national expenditure, the burdens of sickness costs on families and on the public can be greatly reduced through arrangements to distribute these costs among groups of people and over periods of time. The more adequate prevention and care thus made possible would lessen both individual disasters and the

public burdens arising from dependency.

The committee recommended consideration of a comprehensive program designed to increase and improve medical services for the entire population. To finance the program, two sources of funds could be drawn upon: (a) general taxation or special tax assessments, and (b) specific insurance contributions from the potential beneficiaries of an insurance system. The committee recommended consideration of both methods, recognizing that they may be used separately or in combination.

A program of medical care to serve the entire population is an objective to be fully attained only after some years of development. The rôle of the federal government should be principally that of giving financial and technical aid to the states in their development of sound programs through procedures largely of their own choice.

Though this fourth recommendation deals primarily with medical care for self-sustaining persons, the committee recognized that it would be unsound for the states to develop for the self-supporting population medical care programs which are separate and apart from whatever the states might develop for needy persons. Accordingly, the committee proposed that while the fourth recommendation deals primarily with state medical programs for self-supporting persons, a sound state plan should make provision for the care of the needy persons under the same system that is developed for the self-supporting. Accordingly, you will note that this fourth recommendation is broad and absorbs the third recommendation which dealt only with public medical services for the needy and the medically needy.

The fifth recommendation proposed that federal action be taken toward the development of disability compensation—that is, benefit payments to insured workers who are temporarily or perma-

nently disabled. This recommendation contemplates insurance against loss of wages on account of disability.

Under the present social security program, millions of workers may count on some continuance of partial income in lieu of their regular wages when they become unemployed and are able to work.

Under the workmen's compensation laws, most of them are protected against wage loss resulting from accident or injury arising out of employment. But generally they have no protection against wage loss resulting from non-industrial sickness or accident. A limited number of workers do have some such protection through voluntary insurance schemes, commercial or non-profit, but they are a small minority in the total.

There is good reason to believe that insurance against disability can best be treated not by a single insurance system but by two systems closely coördinated. There is, first, the problem of the temporarily disabled worker—the worker who has an acute illness and for whom there is every reason to expect that, after a few weeks or a few months, he will recover and return to work. There is, second, the problem of the permanently disabled worker—the worker who, by reason of crippling or chronic illness, will probably never again be able to enter gainful employment.

Temporary disability compensation, with a substantial waiting period—7, 10, or 14 days, with benefits calculated at 50 per cent of wages for a benefit period of at least 26 weeks, would cost approximately 1 per cent of wages. The cost should probably be divided between employers and workers, though a share of the cost might be carried by general taxation. Such an insurance system would normally be financed on an annual fiscal basis, involving no reserves other than for operating and contingency purposes.

Permanent disability insurance, with

benefits geared to old-age and survivors' benefits, would probably cost 0.2 per cent to 0.3 per cent of wages in the early years, but the cost may be expected to rise in the course of years, the exact costs depending upon the size of the benefits provided and upon numerous other factors. This type of insurance could be established by liberalizing the present federal old-age insurance system.

ENDORSEMENTS OF RECOMMENDATIONS

You will note that these five recommendations present alternative programs to be selected or modified by the states. Except for the proposal to integrate permanent disability (invalidity) insurance with the federal system of old-age insurance, all the recommendations place the federal government in the rôle of giving financial and technical assistance toward programs which are to be operated by the states and the local communities. The recommendations propose, not the building up of a vast federal health machinery, but the strengthening and growth of the existing state and local arrangements through which health and medical services are furnished.

The reports and recommendations were submitted to the members of the National Health Conference, who included both lay and professional persons representing the widely diverse groups who constitute the population of the United States and who are actively concerned with health and welfare. As you know, the national health program submitted to the Conference has been the subject of active study and discussion among many public groups, both lay and professional, since July. Various groups concerned with labor, agriculture, welfare, and health have not only indicated their deep interest in the program, but have given it broad and substantial approval.

The American Medical Association

called a special meeting of its House of Delegates in September to study the recommendations. It is gratifying that this body saw its way clear to endorse the substance of the four recommendations dealing with expansion of public health, maternal and child health services, construction and improvement of hospitals and related facilities where needed, medical care for needy persons, and insurance against disability wage loss. The House of Delegates did not, however, see its way clear to endorse the fourth recommendation, dealing with the development of a general medical care program through taxation or insurance, or a combination of the two.

Though I have referred to the endorsements which the national health program has already received, I would like to place my emphasis otherwise. At this time, the Interdepartmental Committee is more concerned that the national health program should receive careful and critical scrutiny than that it should be endorsed. I cannot emphasize too often that the recommendations were submitted to the National Health Conference as a basis for discussion and not as a blueprint for adoption. We therefore hope that the recommendations will continue to be carefully studied by both lay and professional groups.

PERSONNEL AND ADMINISTRATIVE PROBLEMS

The national health program contemplates developments which would have profound implications for public health administration at all levels of government — national, state, and local — and for voluntary agencies as well. Safeguards are set up, first, in the fact that every element in the recommended program contemplates gradual rather than sudden development, and, second, that every measure closely related to existing health activities proposes operation at the state and local level and is integrated with existing activity.

The recommendations were visualized in terms of a development which might attain its goal in about 10 years. Even such a rate of development might have seemed too rapid a few years ago. Many of you will recall the fears first expressed when the programs to strengthen public health and child and maternal services were being developed in the original design of the Social Security Act. However, the state and local departments of health and the public health professions soon found that the financial aids which became available under titles V and VI of the Social Security Act were quickly absorbed into the existing programs, and only too soon the funds were found to be inadequate. Their inadequacy, I might remind you, was fully foreseen when the Social Security Act was being designed. The appropriations requested had been deliberately reduced below those which our studies had shown to be necessary, so as to avoid a potential shortage of trained personnel. Experience has shown, however, that a gradually expanding program develops its own stimulus for the training and development of the personnel needed.

I do not wish to minimize the problems involved in the development of competent personnel. No doubt this touches on one of the most difficult of all problems involved in the national health program. I am confident, however, that the experience under titles V and VI justifies our belief that a gradually expanding program, such as was recommended by the Technical Committee, will stimulate development of adequate personnel if federal grants-in-aid continue to assist the training of needed personnel. I would also like to point out that personnel can be trained if we have funds and facilities, but they can become experienced only by doing the jobs for which they were trained.

Health services are at many points interlocked with welfare services, and

in the nature of the case this is inevitable. Much thought and attention is being given to the question where the primary responsibility should be placed for those major elements of the recommended program which have both health and welfare aspects. Should such administrative responsibility reside primarily with the health or with the welfare authority? I do not profess to know the answer at this time. It has been suggested, however, that in states where welfare authorities have had no specific responsibility under state law to administer health and medical services for persons with whose care they are otherwise charged, the primary responsibility should be assumed by the health authorities; in other states, where welfare authorities have broad responsibilities for health and medical services according to state law, but where they have had meager funds or none for the discharge of these responsibilities, it is suggested that there also the responsibility should reside with the health agencies. In still other states, where the welfare authority has been actively administering certain health services, it is suggested that such arrangement might continue. These are matters which obviously must be determined by the states rather than by the federal government. We have supposed, however, that federal standards would require that in every case there should be provisions in the state plans for the close and effective coördination of the work of related health and welfare agencies.

THE FUTURE SCOPE OF PUBLIC HEALTH

In a final sense, questions of finances, personnel and administrative responsibilities are secondary. What is the necessary scope of public health service in the future? That—it seems to me—is the basic question. The answer to this question will determine in large measure the part that you, as public

health practitioners, will play in the health program of the future.

Public health practice is as old as society. In its modern form, however, it is a young branch of public administration. The major activities of local, state, and federal health agencies are of surprisingly recent development. Yet the development has been so active that when we find that basic technics are not carried out in a community, we surmise that adequate funds and trained personnel are lacking. Experience shows clearly that the improvement of health services in poor localities may generally be effected by provision of adequate funds. You, the professional public health practitioners, have the knowledge and skills to carry out the tasks which we have come to recognize as public health activities.

While you have been developing preventive technics, the nation has been growing older, more populous, and more complex. Health needs have become highly diversified, and the diversification has been accompanied by other developments of the most profound importance to you. No longer is it possible for you to draw a sharp line between prevention and treatment. As medical knowledge and skill have increased, the public has become more coöperative and more alert to its health needs. The public nowadays wishes to avoid illness and disability that formerly were assumed to be the lot of mankind. They have learned through the efforts of health agencies and from the press, the radio, and other media of communication that a large part of illness which they still suffer is avoidable, that medical care in the early stages of illness frequently prevents the development of serious disabilities. The public knows that the professions possess the knowledge and skills requisite to make this a much more healthful nation than it is at present. With this public understanding of the possibilities inherent in

health service has come a popular demand that there be made available to everyone, regardless of economic status, the services and facilities which now all too frequently are luxuries beyond the reach of those who have small means. The public is no longer satisfied to secure medical care only under the pressure of actual pain and sickness; rather, it wishes to conserve health by avoiding illness, and it wishes to secure health wherever possible by the full use of all the services at the disposal of the professions.

It is because of this awakening of the American people to the possibilities of positive health activities that I foresee the broadening of public health services beyond their present scope. The American Public Health Association, I am fully convinced, is at the beginning of a new era in the field of health services and medical care. I think you are going to have increased opportunities to develop our communities into healthier and happier places in which to live. Indeed, public health work in America has been moving in this direction for a long time, and it has become evident to many of you—as it has to many of us—that you have been but laying the foundations for the national health structure that we hope is to be built in the years ahead.

In all of the development which has occurred, it seems to me that a fundamental trend stands out plainly and clearly. Not long ago—as society measures time—public health practice was concerned very largely with the sanitation of the environment; then its emphasis shifted to the infectious diseases; and then it shifted again to the problems of personal hygiene. In each of these periods, public health practice built upon the accomplishments of the prior periods. Through each of these periods, emphasis was still primarily upon prevention. The line which sepa-

rated prevention from treatment was once sharp, but latterly it has become dull. All recent trends point to the time when this demarcation will be possible only with steadily increasing difficulty. Indeed, it seems to me that the time has already arrived when public health administration must be prepared to discard that old separation *between prevention and cure*.

It is my impression that for at least a decade the public has not understood or appreciated why community responsibility—as expressed through the work of its health department—ended with prevention in those situations when prevention fails to be effective. As society faces the existing need to deal more adequately with sickness, it turns more and more to its public health officers, and it expects them to take on larger burdens and increasing responsibilities. Society looks to the public health officers for more service and on a broader front. Society is compelled to do this because its only alternative is to turn to agencies less equipped, professionally and technically, to deal with health problems.

I would not give you the impression *that I think the official health agencies* should become charged with obligations to provide all the health and medical services which a community needs. What I do have in mind has been said so effectively by others that, even at the risk of trying your patience, I want to read a lengthy quotation which seems to me to offer a sound guide for a developing public health program.

Health officers were once content to deal only with the most urgent sanitary needs of the environment and with the most pressing problems in the control of communicable diseases. In more recent years, it has come to be recognized that the responsibilities of the health department embrace other fields. The modern health officer has an obligation to educate the public in the ways of healthful living, in the prevention of infant and maternal deaths from certain causes, in the postponement of deaths from some causes not

preventable. It is now recognized that his responsibilities go even further. Evidence of many sorts has shown that some of the greatest opportunities to improve the public health involve the early diagnosis of diseases which are at best only partially preventable and which in the past have not been dealt with on a community basis, and the provision in the community of personnel and facilities whereby early diagnosis can be followed by prompt and adequate professional care. The increasing complexity of social forces and their effect upon the health of individuals focuses attention upon diet and nutrition, upon housing, upon opportunities for recreation, and upon social and economic factors generally which exert profound influences upon health. The modern health officer must be concerned not only with community health service as formerly envisaged, but also with the general health of the individual and with the social and economic circumstances of the community in so far as they affect the health of the individual. However, in focusing attention upon the individual, the health department cannot afford to neglect the services to the community as a whole.

Though the modern health officer has wider opportunities than his predecessor, this does not mean that he or the local government must necessarily assume responsibility for providing all the services which come within the field of health interest. It does mean that he has broad responsibility to survey the health conditions in his community, to measure its health needs, to ascertain the extent to which his community is supplied with necessary personnel and facilities, and to participate in the formation of practical plans—appropriate to the community's needs and means—to assure that adequate personnel and institutions are available in the community. On this basis, the health officer becomes the officer of local government chiefly responsible for planning, whether the service is to be administered by the health department or by other agencies, public or private, organized or unorganized, collective or individual.

Some of you may have recognized this quotation. It comes not from some uninformed or ill-advised group. It is not the dream of some academician. It is a statement of policy published under the imprint of your own Committee on Administrative Practice which for many years has guided your Association wisely and skillfully in public health administration. These two paragraphs

which I have just read are taken from the statement of policy which appears in your recently issued *Appraisal Form for Local Health Work*. It seems to me that the aims and objectives of the national health program developed by our Technical Committee on Medical Care can be met wisely and effectively within the framework of the policy laid down by your Standing Committee.

Public health practice in its modern form is a relatively young art. Its vitality is evident, however, not only from its accomplishments of the past, but also by the diversity of the professions which it has come to embrace. You have won and you hold the confidence of the public. The accomplishments of the past, to which you can turn with pride, are notable and significant, and they are greatly appreciated by society. It is not sufficient, however, merely to praise past performances or accomplishments. The accomplishments of the past in health conservation are

secondary to the needs of the present and of the future. Government, which is the instrument of the public will, must, go forward, seeking out ways for those further advances which can be made by dealing with the needs which still prevail. The amount of preventable sickness and disability, the volume of unattended disease, the rate of premature mortality, and the prevalence of individual and social burdens created by sickness are a challenge which we must meet.

The national health program is no finished blueprint; it is only a first sketch. The reports of our Technical Committee are before you for study, discussion, and criticism. The Interdepartmental Committee will be grateful to you, collectively or individually, for the help you can give in designing and developing a still better and more specific program which may guide the nation in its effort to improve the public health.

Attitude of the American Medical Association Toward the National Health Program *

IRVIN ABELL, M.D.

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FOLLOWING the passage of the Social Security Act, the President appointed an Interdepartmental Committee to Coördinate Health and Welfare Activities in order that the full benefits of the federal program under the act's provision may reach with minimum delay and maximum effectiveness the men, women, and children for whose purpose the program was brought into existence. Its chairman, Josephine Roche, LL.D., in a memorable address made to this Association during its 1937 annual meeting, and in a paper read to the House of Delegates of the American Medical Association in June of this year, presented data, statistics, and conclusions assembled by the Technical Committee on Medical Care, a subcommittee of the Interdepartmental Committee. The studies of this subcommittee indicated that the deficiencies of the present health services in the United States fall into four broad categories.

1. Preventive health services for the nation as a whole are grossly insufficient.

2. Hospital and other institutional facilities are inadequate in many communities, especially in rural areas, and financial support for hospital care and for professional services in hospitals is both insufficient and precarious,

especially for services to people who cannot pay the costs of the care they need.

3. One-third of the population, including persons with or without income, is receiving inadequate or no medical service.

4. An even larger fraction of the population suffers from economic burdens created by illness.

At the National Health Conference held in Washington in July at the call of the Interdepartmental Committee to Coördinate Health and Welfare Activities a National Health Program was submitted comprising five recommendations "designed to meet with reasonable adequacy existing deficiencies in the nation's health services." Before reporting the action of the House of Delegates of the American Medical Association on these proposals I beg your indulgence in briefly discussing the principles and policies of the Association relative to a wider distribution of medical care and of its experimentation in this field, indicating both its awareness of the changing needs and of its efforts to meet such needs on an evolutionary basis. The principles and policies adopted in the past have been developed with the single purpose of maintaining the quality and standards of medical care. The American Medical Association has constantly recognized the need for continued expansion of preventive medicine and a wider use of medical

* Read at a Special Session on Public Health Aspects of Medical Care of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 26, 1938.

care. It has, however, at the same time been greatly concerned with the methods of administering both preventive medicine and medical care and with the ultimate effect of various changes on the morale as well as the health of our people. It is a fundamental tenet of the American Medical Association that the poverty of a patient should demand the gratuitous services of a physician. It is also a fundamental tenet of the American Medical Association that it is unprofessional for a physician to dispose of his services under conditions that make it impossible to render adequate service to his patient because to do this is detrimental to the public. Within these fundamental tenets experimentation in new forms of medical practice has not been inhibited. Among the main types of medical care plans now in operation or proposed throughout the United States by the medical profession and other interested agencies the following may be mentioned:

1. State and County Medical Society Plans, of which 152 are operating and 80 proposed. These fall into three main categories—plans to care for the indigent sick, postpayment plans, and prepayment plans to care for the low income groups.

2. Group Hospitalization Plans, of which 68 are operating and 62 proposed, designed to furnish hospital services on a prepayment basis.

3. Hospital Insurance Companies, 54 operating, offer cash benefits for expense due to hospital residence.

4. Flat Rate Plans, 19 operating, whereby an all-inclusive charge is specified for designated services.

5. Industrial Medical Care Plans, of which there are at least two thousand in operation. These are largely of two main types, one providing first aid and emergency care for employees and supervision of plant hygiene and safety conditions, the other providing more extensive medical care for employees, and often for their dependents.

6. Medical and Hospital Benefit Organizations, of which there are at least five hundred whereby funds are accumulated from members through the sale of membership certificates and contracts for the purchase of medical and hospital services.

7. Union Sick Benefit and Fraternal Plans, whereby medical and hospital services are furnished members of a trade union or fraternal order.

8. Group Practice Plans, of which there are more than three hundred, afford arrangements whereby physicians cooperate in practice.

9. Student Health Services, of which there are at least three hundred, which may be compared to industrial health services with particular emphasis on health education.

10. Rural Medical Care Plans, of which there are two main types, one, health associations which guarantee a physician an annual income as an inducement to locate in the community, the other, Farm Security Administration Plans to provide medical service for low income or destitute farm families.

The American Medical Association has never opposed suitable care by municipal, county, state, or other governmental agency for the indigent or those on the borderline of indigency. It has never opposed suitable participation by the government through any of its agencies in preventive medicine, or in any legitimate function of the government in relationship to the care of the sick. The Association has constantly opposed any attempts on the part of the local, county, state, or federal governments to make medical care a political issue. The Association has never opposed the principles of insurance, but it does oppose the political administration and manipulation of the insurance organization and the interposition of any outside agency in the relationship between doctor and patient which is fundamental to good medical care. The principles and policies thus far established do not forbid nor have they ever contemplated any opposition to a well considered, expanded program of medical service when the need for such is established. Neither is there any fundamental principle or policy which in any manner opposes aid to the indigent or medically indigent when such indigency is established. With these principles and policies in mind the American Medical Association convened its legis-

lative body, the House of Delegates, in Chicago in September, inviting to the meeting the secretaries and editors of its component state associations, for the purpose of considering the program submitted by the Interdepartmental Committee at the National Health Conference. At the conclusion of its deliberations, during which full opportunity was afforded the representatives of the 110,000 members of the Association for discussion of the matter at hand, unanimous approval was given to the final report of the Reference Committee of the House. In expressing to you the attitude of the American Medical Association toward the proposed National Health Program, I cannot do better than give you, verbatim, the committee report, which reads as follows:

"Since it is evident that the physicians of this nation, as represented by the members of this House of Delegates convened in special session, favor definite and decisive action now, your committee submits the following for your approval:

"1. Under Recommendation I on Expansion of Public Health Services: (1) Your committee recommends the establishment of a federal department of health with a secretary who shall be a doctor of medicine and a member of the President's Cabinet. (2) The general principles outlined by the Technical Committee for the Expansion of Public Health and Maternal and Child Health Services are approved and the American Medical Association definitely seeks to coöperate in developing efficient and economical ways and means of putting into effect this recommendation. (3) Any expenditures made for the expansion of public health and maternal and child health services should not include the treatment of disease except so far as this cannot be successfully accomplished through the private practitioner.

"2. Under Recommendation II on

Expansion of Hospital Facilities: Your committee favors the expansion of general hospital facilities where need exists. The hospital situation would indicate that there is at present greater need for the use of existing hospital facilities than for additional hospitals.

"Your committee heartily recommends the approval of the recommendation of the technical committee stressing the use of existing hospital facilities. The stability and efficiency of many existing church and voluntary hospitals could be assured by the payment to them of the costs of the necessary hospitalization of the medically indigent.

"3. Under Recommendation III on Medical Care for the Medically Needy: Your committee advocates recognition of the principle that the complete medical care of the indigent is a responsibility of the community, medical and allied professions, and that such care should be organized by local governmental units and supported by tax funds.

"Since the indigent now constitute a large group in the population, your committee recognizes that the necessity for state aid for medical care may arise in poorer communities and the federal government may need to provide funds when the state is unable to meet these emergencies.

"Reports of the Bureau of the Census, of the U. S. Public Health Service, and of life insurance companies show that great progress has been made in the United States in the reduction of morbidity and mortality among all classes of people. This reflects the good quality of medical care now provided. Your committee wishes to see continued and improved the methods and practices which have brought us to this present high plane.

"Your committee wishes to see established well coördinated programs in the various states in the nation, for improvement of food, housing, and the

other environmental conditions which have the greatest influence on the health of our citizens. Your committee wishes also to see established a definite and far reaching public health program for the education and information of all the people in order that they may take advantage of the present medical service available in this country.

"In the face of the vanishing support of philanthropy, the medical profession as a whole will welcome the appropriations of funds to provide medical care for the medically needy, provided, first, that the public welfare administrative procedures are simplified and coördinated; and, second, that the provision of medical services is arranged by responsible local public officials in coöperation with the local medical profession and its allied groups.

"Your committee feels that in each state a system should be developed to meet the recommendation of the National Health Conference in conformity with its suggestion that 'The rôle of the federal government should be principally that of giving financial and technical aid to the states in their development of sound programs through procedures largely of their own choice.'

"4. Under Recommendation IV on a General Program of Medical Care: Your committee approves the principle of hospital service insurance which is being widely adopted throughout the country. It is susceptible of great expansion along sound lines, and your committee particularly recommends it as a community project. Experience in the operation of hospital service insurance or group hospitalization plans has demonstrated that these plans should confine themselves to provision of hospital facilities and should not include any type of medical care.

"Your committee recognizes that health needs and means to supply such needs vary throughout the United States. Studies indicate that health

needs are not identical in different localities but that they usually depend on local conditions and therefore are primarily local problems. Your committee therefore encourages county or district medical societies, with the approval of the state medical society, of which each is a component part, to develop appropriate means to meet their local requirements.

"In addition to insurance for hospitalization your committee believes it is practicable to develop cash indemnity insurance plans to cover, in whole or in part, the costs of emergency or prolonged illness. Agencies set up to provide such insurance should comply with state statutes and regulations to insure their soundness and financial responsibility and have the approval of the county and state medical societies under which they operate.

"Your committee is not willing to foster any system of compulsory health insurance. Your committee is convinced that it is a complicated, bureaucratic system which has no place in a democratic state. It would undoubtedly set up a far reaching tax system with great increase in the cost of government. That it would lend itself to political control and manipulation there is no doubt.

"Your committee recognizes the soundness of the principles of workmen's compensation laws and recommends the expansion of such legislation to provide for meeting the costs of illness sustained as a result of employment in industry.

"Your committee repeats its conviction that voluntary indemnity insurance may assist many income groups to finance their sickness costs without subsidy. Further development of group hospitalization and establishment of insurance plans on the indemnity principle to cover the cost of illness will assist in solution of these problems.

"5. Under Recommendation V on Insurance Against Loss of Wages Dur-

ing Sickness: In essence, the recommendation deals with compensation of loss of wages during sickness. Your committee unreservedly endorses this principle, as it has distinct influence toward recovery and tends to reduce permanent disability. It is, however, in the interest of good medical care that the attending physician be relieved of the duty of certification of illness and of recovery, which function should be performed by a qualified medical employee of the disbursing agency.

"6. To facilitate the accomplishment of these objectives, your committee recommends that a committee of not more than seven physicians representative of the practising profession, under the chairmanship of Dr. Irvin Abell, President of the American Medical Association, be appointed by the Speaker to confer and consult with the proper federal representatives relative to the proposed National Health Program."

Dr. H. H. Shoulders, Speaker of the House of Delegates, appointed the members of the Committee to Confer and Consult with Proper Federal Representatives as follows:

IRVIN ABELL, M.D., President, A.M.A.,
Chairman

WALTER F. DONALDSON, M.D., Pittsburgh,
Pa.

WALTER E. VEST, M.D., Huntington, W. Va.

FRED W. RANKIN, M.D., Lexington, Ky.,
Section on Surgery

FREDERICK E. SONDERN, M.D., New York,
N. Y.

HENRY A. LUCE, M.D., Detroit, Mich.

E. H. CARY, M.D., Dallas, Tex.

DRS. ROCK SLEYSTER, President-Elect, and OLIN WEST, Secretary, were declared by the Speaker to be members of this committee, ex-officio.

The President of the United States has appointed the Interdepartmental Committee to Coördinate Health and Welfare Activities and the Technical Committee on Medical Care to represent the federal government, and October 31 (1938) has been set as the date for the Conference. The committee of the American Medical Association is imbued with the hope and finds much to encourage it in the belief that a joint consideration of the data and plans accumulated by the Interdepartmental Committee and those available from the study of the American Medical Association will suffice to reconcile the differences heretofore existing as to the procedure to be followed in making a proper and sufficient distribution of health facilities and to see a realization of the objectives to which both groups are committed, namely, the provision of good medical care for all the people; the development of comprehensive preventive and public health services; the development of appropriate measures to combat specific health problems; and a continuous, orderly improvement of the distribution of medical services and hospital facilities, both by geographic and economic divisions.

The Public Health Aspects of Medical Care*

From the Standpoint of Public Health

C.-E. A. WINSLOW, DR.P.H., F.A.P.H.A.

*Professor of Public Health, Yale School of Medicine,
New Haven, Conn.*

MR. ALTMAYER has an obvious right to speak for the Interdepartmental Committee to Coördinate Health and Welfare Activities of the federal government; and Dr. Abell has an obvious right to speak for the medical profession as organized in the American Medical Association. I am in a less fortunate position. When I was asked to address you from the standpoint of the consumer I thought—how can I—how can anyone—represent the consumers of the United States—the farmers of our great Central Basin, the steel workers of Chicago, the textile operatives of Rhode Island, the miners of Pennsylvania, the automobile mechanics of Detroit, the stockbrokers of New York, the bankers of Boston, the ranchmen of Texas, the dock laborers of San Francisco, the cotton pickers of Alabama, the hill-billies of the Appalachians, the storekeepers of Keokuk?

Yet it is very important that the consumer should be represented, however imperfectly. The purpose of medicine is to serve these manifold individual citizens. The physician exists

for the patient, not the patient for the physician. And if any one group of persons is to speak for the consumer in this field, it is surely the public health group. The health officer is, after all, the only individual in a given community who is primarily responsible for the health of all the people in that community. The public health profession does, in fact—always and everywhere and in a unique sense—represent the health interests of the consumer; and this afternoon I have been asked to represent the public health profession.

Our responsibility in this connection has not been unrecognized in the past. Twelve years ago, the President of the American Public Health Association* suggested the following four fundamental principles operating in this field; and they seem to me as valid in 1938 as they were in 1926.

1. Future progress in the reduction of mortality and in the promotion of health and efficiency depends chiefly upon the application of medical science to the early diagnosis and preventive treatment of disease, particularly organic diseases of adult life and mental diseases and maladjustments at all ages.

2. The purely individualistic practice of medicine as it has existed in the past must

* Read at a Special Session on Public Health Aspects of Medical Care of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 26, 1938.

* A.J.P.H., 16, 11:1084 (Nov.), 1926.

be increasingly supplemented by some form or forms of organized medicine which will offer to the individual modern scientific medical care including laboratory and specialized consultation service on an economic basis which will facilitate its application to the prevention of incipient disease—probably on some basis which involves payment of the physician through a common fund for the supervision of the health of an individual rather than for the treatment of a specific ailment.

3. The health officer as an official responsible to the community for the promotion of the public health in all its possible aspects should consider it his primary responsibility to work out in coöperation with the medical profession a wise solution of this problem—a solution which will preserve and maintain all that is best in the noble tradition of the healing art.

4. In the last analysis, it will be the duty of the health officer of the future to see that the people under his charge, in city or country, in palace or tenement, have the opportunity of receiving such services as that outlined above and on terms which make it economically and psychologically easy of attainment; and, himself, to furnish such service if and when it cannot be provided in other ways.

Today, at last, such ideals as those outlined above seem actually within the scope of attainment; and that this is true is primarily the result of the extraordinary National Health Conference held in Washington on July 18–20 last. As Surgeon General Parran said at that time:

Those of us who are concerned with the progress of medical science usually think that the great events of medicine occur only in the research laboratory or the operating room. We are witnessing here in Washington another kind of progress in medicine—an effort to put medical science to work. The National Health Conference may well be the greatest event in medical science in our time.

This Conference was significant for many reasons, but, first and foremost perhaps, because it definitely and finally demonstrated the urgent and critical need for prompt and effective action. To many of us, the report of the Committee on the Costs of Medical Care in 1932 made this need reasonably clear;

but there have been those who doubted, those who attempted to minimize the pressing nature of the problem. As a result of the National Health Survey of nearly 3 million persons in 800,000 families conducted by the U. S. Public Health Service through the coöperation of WPA, those doubts can exist no longer and those efforts to divert attention from the problem must inevitably fail.

"Let's look at the record." Fifty million Americans in families receiving less than \$1,000 income a year; one-third of the 35 million children in the United States in families unable to make appreciable payments for private medical care.

Morbidity and mortality increasing steadily and progressively as income decreases; for the 10 most important diseases, a death rate almost twice as high among unskilled laborers as among professional men; workers in industry showing a life expectancy approximately 8 years less than that of non-industrial workers.

Medical care actually received going steadily down in lower economic levels as the need for medical care increases; 1 person out of 4 among the 40 million people in the relief and marginal groups receiving no medical care whatever for disabling illness lasting 1 week or more; nearly a quarter of a million women in 1936 without the care of a physician in childbirth.

Over 40 per cent of the counties in the United States without a registered general hospital to serve their 17 million people.

More than two-thirds of the counties of the United States, and an even larger proportion of its cities, without full-time professional health officers; two-thirds of our rural areas without child health centers or clinics; only 5 states with adequate sanatorium facilities for tuberculosis; programs for control of syphilis and industrial diseases incom-

plete, and those for cancer and pneumonia control and for mental hygiene scarcely even initiated, except in half a dozen states.

The silence at Washington after Paul Kellogg interrupted a somewhat acrimonious debate by asking the simple question, "Does anyone seriously challenge the statements of need that were made in the papers this morning and were amplified this afternoon?" was one of the most dramatic moments of the conference.

The second outstanding feature of the Washington Conference was the program of action to meet these needs, presented with extraordinary skill by the Technical Committee on Medical Care of the Interdepartmental Committee—a program which formed the major basis for the last 2 days of discussion. This report was notable for the care with which it had been prepared, for its soundness and, particularly, for its balance. It was not a program for public health expansion, a program for the extension of medical service, a program for health insurance. It was a complete, coördinated, interlocking, dovetailing health program for the nation, in which all these objectives have their just and proper part.

The *first* recommendation of the Technical Committee—and one of the two for which it suggested special priority—was a major extension and modernization of our basic health services. This program, to be accomplished by the methods of federal grants-in-aid so successfully applied already on a small scale under the Social Security Act, has been fully discussed by Mr. Altmeyer. It needs no argument before my present audience and appears to be unanimously supported.

The *second* recommendation — also given special priority by the committee — deals with the provision of adequate hospital facilities for all the people of the United States and the meeting for

the first 3 years of one-half the maintenance charges for necessary construction. This need was challenged by a few speakers at the National Health Conference on the basis of a survey which followed the extremely naïve plan of drawing a circle of 30 mile radius round every hospital of any size and considering each county as well served which at any point was cut by such a circle. On this basis, a single 10 bed hospital would be adequate for the city of New York. A study of the data presented by the Technical Committee at Washington will convince any competent student of the soundness of its conclusions.

The *third* recommendation dealt with the medical care of the 20 million persons now receiving public assistance in one form or another and of the additional 20 millions, so close to the emergency level that they can purchase medical care only at the expense of food, shelter, and other basic essentials of life. Current provision for these groups — though furnished to a considerable extent by many state and local governments, supplemented by the generosity of voluntary organizations and professional practitioners — meets only two-thirds of their vital needs. A maximum expenditure of \$400,000,000 is proposed for this purpose, approximately one-half to come from federal funds, as in the case of expenditures under recommendation 1 and 2. This proposal will certainly not be opposed by the professions concerned or by the ultimate consumer. The question how such services are to be administered is, however, of considerable importance. I myself feel it essential for maximum effectiveness that all tax supported medical services should be provided by the one government bureau which is primarily equipped to furnish medical direction, the health department; and it was a source of great gratification to me that the speakers representing the welfare agencies at

the Washington Conference unqualifiedly accepted this view. It seems to me of major importance that the health officers, federal, state, and local, should be ready to accept the opportunity which is now offered to assume primary responsibility for extra-mural tax supported medical care. If this opportunity should be lost, it may not be presented again.

The *fourth* recommendation of the Technical Committee dealt with the more difficult and more controversial problem of medical care for persons on a higher income level than those who should receive free medical care under recommendation 2. At the bottom of the economic scale is "a third of the nation" who can pay none, or but a small part, of the cost of medical care. At the top is a small group who can meet even the emergency costs of unexpected illness. The great bulk of our population lies between. They can pay the average cost of medical care, some \$30-\$36 per person per year. But they cannot, as individual families, budget for the random catastrophe of serious medical emergencies. There is but one hope for this group (and for the professional personnel serving this group), the spreading of the costs of medical care over a number of families and over a period of time. It is a method which is simple, logical, inevitable. It is a method which, in some form or another, has been adopted by almost every civilized country in the world. The actual spreading of the economic burden of medical care can be accomplished, as the committee points out, either by taxation, by insurance, or by a combination of the two. "Experience in many countries suggests health insurance for urban and industrial areas and public medical services for rural and agricultural areas." The committee recommends federal grants-in-aid to the states for the development of broad programs of medical care along one or both of these

lines. It is obviously essential that professional standards of service should be safeguarded in any program of this kind, and the formulation of such safeguards is the business of the medical profession. The method by which the consumer elects to pool his financial resources to pay for medical service is, as I see it, *his* business which he must accomplish according to his own desires and with the counsel of the appropriate experts in this field, the statistician and the economist.

Finally, the *fifth* recommendation, with which we are here less directly concerned, recommends the development of a national program for insurance against the financial losses due to disability.

The first striking feature about this epoch making report was its presentation to the Conference by a committee of 5 independent government departments working in coöperation. You and I can remember occasions on which different federal agencies working in the health field were not always in complete agreement. Yet here were representatives of nearly half the President's Cabinet presenting a unanimous program for national health. For this miracle of coördinative action we owe a deep debt to one of the ablest and finest and most useful women in these United States, Josephine Roche.

The second striking feature of the Conference was the astounding consensus of support for its main objectives from the groups represented. I have, for 10 years, sat in at discussions of this subject, in Washington and elsewhere, but never before has it been discussed face to face with those great agencies which really represent the American people. When this health program received, as it did receive, in general principle and in broad method, the support of both the great labor organizations of the country, of the agriculture of the country, of the busi-

ness of the country, with that splendid phrase of Mr. Taussig's, "That a tax supported health program was not a burden on industry but a subsidy to industry," and with that other magnificent phrase of his, that "democracy should be a sword as well as a shield"; when we heard the support of the women of the country, and the parents of the country, and the youth of the country, and the radio and the press—this was an event of the most profound significance. The A.F. of L. and the C.I.O., the American Farm Bureau Federation, the Amalgamated Clothing Workers, the United Automobile Workers, the United Mine Workers, the Y.W.C.A., the Federation of Women's Clubs, the National Congress of Parents and Teachers—all were represented and all in favor. As Hall and Kellogg said in their admirable review in *The Survey*:

Alongside physicians, surgeons, dentists, nurses, hospital managers, and public health men, ranged representatives of labor, industrial and farm organizations; of women's clubs, bodies of consumers, parent-teacher associations, youth organizations, coöperatives; social workers, educators, public welfare administrators and their kin. Here were the patients, if you will: consumers, and spokesmen for would-be-consumers. They had come to say in no uncertain terms that they and their fellows believed in medical care and wanted more of it for everybody. They drove home that, because of locality or income, such care was simply unavailable or inadequate for great numbers of the people they represented; and that those numbers ran into millions. In equally outspoken terms, they believed such care could and should be brought within reach of those millions.

To me, it seemed that I had all my life been hearing about democracy; but that now at last I had seen its face.

The program thus presented and thus endorsed was no cut and dried formula. It was broad, general, flexible—with every opportunity for local initiative in planning and with all but a fraction of the funds for overhead and research to be spent, as in the present Social Se-

curity Act, by state and local governmental authorities.

In the working out of such a program, there are many difficult problems to be solved. One of the most thorny of these is the problem of health insurance, where we find the American Medical Association on one side and all of the most politically powerful consumer groups of the nation on the other. In my judgment, this problem does not relate to the national health program as such, since under recommendation 4 the choice between tax supported service and insurance is left to the states. The conflict will come in the individual states; and in this conflict I seriously question whether the American Medical Association has chosen its position wisely. If provision is to be made for distributing the cost of medical care for the great bulk of our population in the middle economic level—and that it must and will be made seems certain—it can be done in a given area only by tax support or by insurance funds. In making the choice it seems to me that a tax supported organization is essential for preventive service and for the care of the indigent; but that, for families on a higher economic level, in urban areas, insurance has distinct advantages; it promotes the self-respect and sense of responsibility of the patient while it leaves the medical profession as a whole in an independent and more authoritative position. Under a system of health insurance in England, for example, the British Medical Association is taking a position of unqualified leadership.

In all that may be done, I would particularly urge that emphasis be laid upon quality as well as quantity of service. I am personally as much concerned about the people who receive bad medical care as about those who receive no medical care.

We have no right to collect either tax money or insurance funds without being reasonably sure that real value is re-

ceived. As Dr. Hugh Cabot rightly said in Washington:

The minute the government begins to suggest the method and to provide the funds, it assumes responsibility for the product, at once; it must assume a responsibility for the maintenance and improvement of standards, not only in medical care but in medical education and in research. . . . There are very large areas in this country where the practice of medicine as at present carried on is medieval. The physicians practising there are members, properly so, of their county societies and therefore necessarily of the American Medical Association, but who says whether or not the article which they are selling is a first-class article or . . . one which is expensive at any price?

Neither legislation nor long-distance supervision can, in the long run, guarantee a good quality of medical care. There is only one agency which can insure that physicians operate at maximum efficiency and that is the medical profession itself. But for this purpose the medical profession must be organized—and organized in service groups. The county medical society, like the government, can discipline the most extreme deviations from professional practice. It cannot do more. The organization of groups of physicians for actual service, as in a well organized hospital staff, furnishes the only machinery by which standards can be kept at the highest possible point, through day by day contact and day by day inspiration of the best leadership available. That is why I consider the principle of group practice to be as important as that of group purchase; though this, again, is a personal opinion which relates not to the National Health Program but to details in its working out. It is clear, however, that the medical profession is not now organized effectively for quantity, because physicians are in large measure not where they are needed and it is not now organized in such a way as to give the maximum possible guarantees of quality. This is a question which must be solved, in so

far as may be possible, by the medical profession, through their medical societies, and perhaps better through their hospital staffs, and by the leadership of the health officers of the community.

Throughout the working out of the whole National Health Program are social and economic problems which primarily concern the consumer and his needs and professional problems which primarily concern the physician and his science. They must be solved by patient and open-minded and unselfish deliberation and consultation. It is a cause for deep satisfaction that the American Medical Association at its September meeting has provided for a program of coöperation and has established machinery for making that coöperation effective. We owe, too, a deep debt to the independent Committee of Physicians which has done so much during the past 2 years to crystallize thinking on this matter and to bridge the gap between the producer and the consumer of medical service.

The leaders in this national program will need counsel and guidance; and, above all, they will need the wisdom that can come only from actual experimentation. That is why I feel that the experiments made in industrial medicine, in university medicine, in hospital insurance, are of incalculable value. Above all, the pioneering experiments in coöperative medicine and group health insurance including medical care, are of extreme significance. Nothing seems to me more regrettable than opposition to such experiments—experiments conducted on a voluntary basis and under competent medical guidance. Whether such opposition is in violation of the anti-trust laws, as the U. S. Attorney-General believes, I do not know. But I am certain that it is shortsighted to attempt to block the one avenue of approach which maintains to the fullest degree the independence of the patient and the leadership of the physician: I

am convinced that the principle of freedom of choice of physician should be furthered to the maximum degree; but I should like to emphasize that any acceptable definition of freedom of choice of physicians must include the right of a group of patients to choose a group of physicians for their service. I am certain that any attempts to interfere with that freedom cannot, in the long run, be maintained.

One word more. At the July meetings it was made abundantly clear that criticism of the existing situation is not criticism of the medical profession any more than opposition to the acts of the present federal administration involves an assault on the American home or on the memory of George Washington.

Nothing impressed me more deeply at this Conference than the admiration and affection with which such leaders as Hugh Cabot and Adolph Meyer and Alice Hamilton and Borden S. Veeder and Robert deNormandie and Allan M. Butler and Robert Osgood and John Peters were received by an audience which was strong in its opposition to certain policies of "organized medicine." This was not an attack on the doctor. It was rather a most touching appeal to the medical profession. It has been the boast of the medical profession, and the just boast, and the source of proper pride, that if a woman came with a sick child to an individual physician and said, "My child is suffering and we want you to care for it," he never failed to respond. Now what happened in that week in July was that the representatives of millions of men and women in the United States came to the medical profession as a group and said, "Our people are sick and suffering and we want medical care for them, and we want means provided by which we can pay." Is it possible, is it conceivable that that appeal is going to be rejected? I think not.

The newer challenges of public health

which more and more involve problems of direct clinical service force us as health workers to confront the basic issues involved in the Washington Conference. If these issues are to be carried to a successful conclusion, our health officers must lead in the advance. In large degree you are already showing such leadership. It is to me a source of increasing pride to note how the major advances in modern medical service—in the control of cancer, of syphilis, of pneumonia—are actually being made by the practising physician, but under the stimulus and guidance of the state and local health officers. You are today leading in these fields. You must carry on with the same initiative all along the line.

A year ago Miss Josephine Roche presented a direct challenge to our organization. She said:

A far step forward would be taken, I think, if the American Public Health Association formally recognized the problem of the present unequal distribution of medical services, and the widespread human needs of today, and charged a special committee to cooperate with the U. S. Public Health Service in extending through proper methods the long accepted functions of public health work to meet modern demands and needs of our people. I hope this action may be taken.

The National Health Conference has made this challenge an imminent one. I earnestly hope that our Association may provide really effective machinery for cooperating with the President's Interdepartmental Committee which is charged with the development of the splendid plans outlined in July.

To many of us, it seems that at last our dreams of 20 years are coming true. Yet the actual realization of the vision cannot come at Washington, but in the local communities throughout the nation. The answer lies in *your* hands. In this year of grace, you stand in the mountain pass and look down into a new land—a land of challenge but a land of incalculable opportunity.

DISCUSSION

FRED K. HOEHLER

Executive Secretary, American Public Welfare Association, Chicago, Ill.

IT is a privilege to participate in this session of the American Public Health Association Conference because I believe you are making history. I can very well agree with most of the principles presented in the papers of this afternoon, particularly in the emphasis given to the need for a high quality of service in any program of medical care which may be adopted by the national or state governments. If you will permit I would like to direct my remarks to the phases of public administration involved in the program discussed here this afternoon. I shall do this in the light of two very sound principles of public administration. First, the administration of related public services should be in a single department under competent direction. Second, responsibility for spending public money should be placed upon public officials who can be held accountable. Dr. Abell's concern for sound administration and quality of service is shared by the American Public Welfare Association and all those who are today serving the states in this field.

Mr. Altmeyer has suggested that there is considerable confusion and some question as to whether the administration of medical care services belong with the welfare or health department. In our present experience most of the medical care provided by public service is under the direction of welfare departments. This is so because our conception of public medical care has been limited to those who are dependent. Then, too, welfare departments had the money for this service and it is natural that the responsibility should have been placed with welfare departments. Another factor in this

present situation is the actual resistance on the part of many health departments in assuming responsibility for medical care, and in some places pressure from local and state medical societies against any effort to place medical care responsibility with health departments.

Economy of operation and administration depends on supervision of accounting and standards just as well as it does on competent direction. We have some concern in this country in the farming out process of public services, and it emphatically has not worked except where there was administrative control and supervision from the sources of funds. It is necessary, therefore, that such public funds as may be spent for medical care be spent under the immediate direction and supervision of public agencies. It is not necessary to duplicate facilities just to spend public funds if those agencies, either public or private, are adequate to meet the needs of the community. It is entirely possible, through payment for services rendered for one public department, to buy services from another or even from a private agency competent and willing to render such services. There must be close coöperation and relationships between welfare and health services regardless of where the responsibility for administration of medical care will eventually reside. This type of coöperation exists today in several states. New York, where the program is at present handled by the welfare department, is an example of the splendid coöperation between the welfare and the health services.

All of us decry, with Dr. Abell, political manipulation in social services, and those who are in attendance at this

meeting and those of us who have responsibility in advising with and directing the broad public welfare services must strive relentlessly to remove political manipulation, whether it is professional or partisan, from the administration of those services. Most of us who are familiar with present arrangements in the subsidy system for instance will agree there is as much politics in the subsidy programs as in both of our national political parties. During the past 10 years of experience of administering coöperative programs between state and local, and state and federal governments, we have learned the necessity of protecting standards of personnel as well as quality of service from all kinds of political manipulation, and the future looks rather brighter as we find the American public expressing a real concern for protection of these standards.

I would like to say just a word about where this service should reside. After watching the operation for the past few

years, it is my considered opinion that the service of medical care, which should realistically go beyond dependent groups in our communities, belongs under professional direction and if at all possible with the health department, but I can assure you that no honest public administrator will assign this job to a department with half-hearted interest or an indifferent attitude even though it be a public health department. In some states it might be better that it reside where it is until health departments and health officials have a more whole-hearted acceptance of the program of medical care.

And, finally, as we move into these new fields, may we avoid the confusion which so often attends the introduction of new governmental services. Since the National Health Conference in July the way seems clear, the call of the people has been a clarion cry, and may all the welfare services join to answer that call.

Questionable Value of Skin Testing as a Means of Establishing an Epidemiological Index of Tuberculous Infection *

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STATISTICAL studies¹ in recent years have shown a striking regional distribution of tuberculosis mortality in the United States. The distribution is especially interesting in the section comprising the central and southeastern states. With a view to determining the factors importantly operative in contrasting situations, the U. S. Public Health Service with the coöperation of the State Health Departments of Alabama and Tennessee, the local health departments directly concerned, and the Tennessee Valley Authority, began in 1936 an intensive detailed study of tuberculosis causation in Coffee County in southeastern Alabama and in Giles County in south central Tennessee. These two counties were selected because they, respectively, are fairly representative of the low tuberculosis rate coastal plain region and of the high tuberculosis rate Tennessee Valley region. Both are very largely rural agri-

cultural counties. The distributions of their populations by land area, by town, village, and open country districts, and by race and nationality are much the same. Giles County appears considerably more prosperous than Coffee County. The mortality statistics, however, show that for the 9 year period 1929-1937 the average annual death rate from tuberculosis per 100,000 population was 116.4 among whites and 210.2 among negroes in Giles County, as against 12.5 among whites and 59.4 among negroes in Coffee County. The recorded rates for the last 9 years are shown in Table I.

The study has included a complete house-to-house survey and family canvass of the two counties for the collection of every datum ascertainable by such procedure which appeared likely to throw any light on the problem. Among the findings from the family canvass is that the difference between the two counties in actual tuberculosis mortality and morbidity rates has been during the last 9 years somewhat greater than is indicated by the state and county official records. The fact

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TABLE I

Number of Deaths Reported and Death Rates (per 100,000 population) from Tuberculosis, by Races and Years, in Giles County, Tenn., and Coffee County, Ala., in the 9 Year Period 1929-1937, and Population Data

Year	Tuberculosis Deaths							
	Giles County				Coffee County			
	White		Colored		White		Colored	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate
1929	32	156.4	13	171.9	3	11.7	3	43.0
1930	21	102.7	14	185.1	5	19.5	1	14.3
1931	25	122.2	16	211.6	4	15.6	12	171.8
1932	22	107.6	22	290.9	2	7.8	2	28.6
1933	23	112.4	14	185.1	3	11.7	2	28.6
1934	23	112.4	17	224.8	4	15.6	1	14.1
1935	19	92.9	13	171.9	6	23.4	2	28.6
1936	25	122.2	19	251.2	2	7.8	7	100.2
1937	24	117.3	15	198.3	0	0.0	7	100.2
Total	214		143		29		37	
Annual Average	23.8	116.4	15.9	210.2	3.2	12.5	4.1	59.4

Population (U. S. Census of 1930)

	Giles County			Coffee County		
	Total	White	Colored	Total	White	Colored
Per cent Urban	28,016	20,453	7,563	32,556	25,662	6,894
Number to square mile of area	12.9			19.1		
	44.6			48.0		

having been established that the incidence rate of demonstrably damaging or of fatal tuberculosis is at least 9 times higher among whites and about 4 times higher among negroes in Giles County than in Coffee County, the question arose whether the difference is due to a difference in extent and degree and kind of distribution of the specific infectious agent or to a difference in operation of environmental and other factors affecting the human host. As it appeared probable that the proportion of persons exposed through familial and other direct personal contact to open cases of the disease during recent years was much larger in Giles County than in Coffee County, a further question which arose was whether the incidence of subclinical tuberculous infection, especially among young persons, was much higher in the former than in the latter county. We, therefore, undertook to carry out along authenticated lines a program for the purpose of

establishing for each of the counties an epidemiological index of tuberculous infection.

PROGRAM

The program comprised tuberculin skin tests by the Mantoux method and X-ray examinations of the chests of representative age-sex-race-community groups totalling about 12,000 persons, or about 20 per cent of the population of each county. In consultation with the authorities of the Henry Phipps Institute and the National Institute of Health it was decided to use in the skin tests one of the preparations of purified protein derivative of tuberculin ("Tuberculin, P.P.D.") because of the reported superiority in potency, specificity, stability, and uniformity of such preparations.² We obtained from a pharmaceutical company, hereinafter designated Co. "A," a supply of P.P.D. in tablet form. Co. "A" is one of the two companies manufacturing and dis-

tributing P.P.D. preparations in the United States under authentically approved conditions.³ Following the lead of the workers⁴ in the Williamson County (Tenn.) project we have X-rayed the chests of all persons tested with the tuberculin preparation whether positive or negative to that test. In our routine skin tests we have used 0.0005 mg., or one-tenth of the usual second strength dose, of the P.P.D. preparation. We were advised⁵ that such dosage would give positives for about 93 per cent of those who would give positives with the usual full second strength dose. Our methods of testing, X-raying, and reading were in conformity with established standards in every respect. School children were the first to be studied. This paper deals mainly with our findings in 4,400 school children in the two counties.

FINDINGS

Of 177 white children ranging in age from 6 to 19 years at the first school tested in Giles County only 14.7 per cent showed positive reactions. This percentage was surprisingly low in view of the reported findings of 43.4⁶ and 61.9⁷ per cent positives to two-dose tests with old tuberculin among white school children in Williamson County, Tenn., and Lee County, Ala., respectively, each of which counties has a recorded death rate from tuberculosis much lower than that of

Giles County.⁸ Suspecting there might be something wrong with our supply of P.P.D., we sent a sample of it to the National Institute of Health. The report returned was that the sample of our supply gave on sensitive guinea pigs corresponding reactions to those of the P.P.D. used there for such testing. Throughout our first round of routine testing among school children in Giles County and Coffee County we continued to use this supply of Co. "A" P.P.D. in the same dosage so that the results in the two counties would be comparable. However, for our information, we carried out among a number of children in each county (1) tests with full second strength dose of P.P.D. of Co. "A" and other tuberculin preparations, and (2) duplicate tests (at the same time in opposite forearms of the same individuals) with this preparation and one of the following preparations: (a) lot 511 of old tuberculin made by a pharmaceutical company (Co. "B") and used in Williamson County and generally by the Tennessee State Health Department; (b) lot 771 of old tuberculin made by Co. "B" and used in Lee County and generally by the Alabama State Health Department; (c) a lot of old tuberculin made by and used extensively by the Michigan State Health Department; and (d) a P.P.D. preparation obtained from Co. "C," the other of the two pharmaceutical companies whose outputs of P.P.D. are

TABLE II

Reactions to Mantoux Tests with Co. "A" Tuberculin P.P.D. (0.0005 mg.) among School Children in Giles County, Tenn., and Coffee County, Ala., by Age, Race and County

Age Group in Years →	5-9		10-14		15-19		Total	
	Number Tested	Per cent Positive	Number Tested	Per cent Positive	Number Tested	Per cent Positive	Number Tested	Per cent Positive
White Children:								
Giles County	455	8.1	722	14.5	480	17.9	1,657	13.8
Coffee County	351	11.7	604	17.7	400	13.5	1,355	14.9
Colored Children:								
Giles County	153	9.2	217	23.5	99	40.4	469	22.4
Coffee County	157	12.7	223	18.8	93	32.3	473	19.5

TABLE III

Results of Retesting with Full Dosage of (1) Tuberculin P.P.D. of Co. "A"; (2) Old Tuberculin of Lot 511 of Co. "B"; and (3) Old Tuberculin of Lot 771 of Co. "B" among School Children Negative to 1/10 of Full Dosage of Tuberculin P.P.D. of Co. "A"

	First Test P.P.D. of Co. "A" 0.0005 mg.		Retest P.P.D. of Co. "A" 0.005 mg.	
	Number Tested	Per cent Positive	Number Retested	Per cent Positive
White Children:				
Giles County	589	15.6	79	1.3
Coffee County	449	10.2	167	15.6
Colored Children:				
Giles County	128	10.2	87	13.8
Totals	1,166	12.9	333	11.7
<i>O.T. Lot 511 of Co. "B" 1.0 mg.</i>				
Colored Children:				
Giles County	387	20.9	164	31.1
<i>O.T. Lot 771 of Co. "B" 1.0 mg.</i>				
White Children:				
Giles County	221	14.5	37	45.9
Coffee County	449	10.2	167	88.6
Totals	670	11.6	204	80.9

reported to be checked authoritatively by clinical trial of every lot manufactured.⁹

The results of our first round of tests are shown in detail in Tables II, III, and IV.

A total of 701 children in several

different schools in the counties who were negative to 1/10 second strength dose of Co. "A" P.P.D. were retested with full second strength dosage (0.005 mg. of P.P.D. or 1.0 mg. of O.T.). Of 333 retested with Co. "A" P.P.D. 11.7 per cent were positive, of 164 retested

TABLE IV

Results of Duplicate Testing in Opposite Arms of the Same Individuals with Co. "A" P.P.D. and Other Tuberculin Preparations among School Children in Coffee County, Ala.

Preparation, Dosage and Site of Injection	Number Tested	Per cent Positive to Both Preparations	Per cent Positive to Co. "A" P.P.D. Only	Per cent Positive to Other Preparation Only
In Left Arm: Co. "A" P.P.D. 0.0005 mg.				
In Right Arm:				
(1) Co. "C" P.P.D. 0.0005 mg.	105	5.7	0.0	25.7
(2) Michigan State Health Department O.T. 0.1 mg.	62	8.1	3.2	11.3
(3) Co. "B", Lot 511, O.T. 0.1 mg.	171	17.5	1.2	35.1
(4) Co. "B", Lot 771, O.T. 0.1 mg.	112	7.1	0.0	71.4
In Left Arm: Co. "A" P.P.D. 0.005 mg.				
In Right Arm:				
Co. "B", Lot 771, O.T. 1.0 mg.	173 *	15.0	0.0	73.4

* This group had been found negative to previous test with 0.0005 mg. of Co. "A" P.P.D.

with O.T. of lot 511 of Co. "B" 31.1 per cent were positive, and of 204 retested with O.T. of lot 771 of Co. "B" 80.9 per cent were positive (see Table III).

Among 450 children in several different schools in Coffee County given simultaneous duplicate tests with 1/10 second strength dose of Co. "A" P.P.D. and with similar dosage of another preparation the results were as follows: positive to P.P.D. of Co. "A" 11.8 per cent, to lot 511 of O.T. of Co. "B" 52.6 per cent, to lot 771 of O.T. of Co. "B" 78.6 per cent, to Michigan State Health Department O.T. 19.4 per cent, and to P.P.D. of Co. "C" 31.4 per cent (see Table IV).*

Since the first round of testing with P.P.D. of Co. "A" in the two counties 460 previously untested children attending three schools in Giles County have been given, under extreme precautions to eliminate possible technical error, simultaneous duplicate tests with P.P.D. of Co. "C" and O.T. of lot 863

of Co. "B." The findings are shown in Table V. To 1/10 of second strength dosage 12.6 per cent were positive to the P.P.D., and 32.6 per cent to the O.T. Of those who were negative to the middle dosage of both preparations 280 were retested, 2 days after the first test, with full second strength dosage of each preparation. Of these children so retested, 9.7 per cent were positive to the P.P.D., and 40.7 per cent to the O.T. Of 93 children negative to the P.P.D. and positive to the O.T. in middle dosage only 19 were positive to the P.P.D. when the dose of that preparation was increased tenfold.

These strikingly variable results indicate that different preparations of tuberculin now used extensively by our health agencies vary greatly in potency and/or specificity and signify that the percentage of positive reactors to skin tests among school children, and inferentially among other general population groups, depends largely upon the particular preparation of tuberculin

* In the body of this paper reactions to skin tests with tuberculin preparations are presented as positive or negative in accordance with the standards of the National Tuberculosis Association. Reactions with areas of induration of 5 millimeters or more in diameter are recorded as positive. Reactions with erythema but without induration, those with areas of induration of less than 5 mm. in diameter whether or not accompanied by erythema and those without either induration or erythema being apparent are recorded as negative. The readings of the degrees of reaction also were in accordance with those standards—areas of induration of 5 to 10 mm. in diameter being read as 1+, those of 10 to 20 mm. as 2+, those exceeding 20 mm. as 3+, and those with both induration and definite necrosis as 4+. Readings were made from 48 to 72 hours after the injections. In our series of duplicate tests with different tuberculin preparations in similar dosages interesting discrepancies were observed not only in percentages of positives but also in degrees of reactions among the positives in opposite arms of the same individuals. The following is an example:

Seventy-one white children in a grammar school in Elba, Coffee County, Ala., were given duplicate tests with 1/10 of second strength dosage (0.0005 mg.) of Co. "A" P.P.D. and Co. "C" P.P.D. Careful measurements in millimeters were made of the areas of induration in the 22 positive reactions. The results were as follows:

	Positive to Both		Positive to Co. "C" P.P.D. Only		Positive to Co. "A" P.P.D. Only
	Co. "C" P.P.D.	Co. "A" P.P.D.			None
	Dimensions in millimeters of positive reac- tions				
	10x12x1	10x11x1	7x7x1	5x5x1	
	13x14x1	7x8x1	10x10x1	8x10x1	
	12x12x1	7x7x1	12x12x2	5x5x1	
	7x7x1	5x5x1	13x14x1	10x12x1	
			7x6x1	5x5x1	
			10x8x1	5x5x1	
			5x5x1	5x5x1	
			6x7x1	6x6x1	
			5x5x1	5x5x1	
Number	4		18		0
Per cent	5.6		25.3		0

TABLE V

Results of Duplicate Testing and Retesting in Opposite Arms of Same Individuals with Tuberculin P.P.D. of Co. "C" and Old Tuberculin, Lot. 863, of Co. "B" among White School Children in Giles County, Tenn.

Preparation, Dosage and Site of Injection	Age-Group in Years → 5-9		10-14		15-19		Total	
	Number Tested	Per cent Positive	Number Tested	Per cent Positive	Number Tested	Per cent Positive	Number Tested	Per cent Positive
Co. "C" P.P.D. 0.0005 mg. in left arm	131	4.6	205	15.1	124	16.9	460	12.6
Co. "B" O.T. 0.1 mg. in right arm	131	22.1	205	37.1	124	36.3	460	32.6
							<i>Number Retested</i>	<i>Per cent Positive.</i>
Co. "C" P.P.D. 0.005 mg. in left arms of children found negative to 0.0005 mg. of Co. "C" P.P.D.							373	12.3
Co. "B" O.T. 1.0 mg. in right arms of children found negative to 0.1 mg. of Co. "B" O.T.							281	40.6
					<i>Per cent Positive to Both Preparations</i>	<i>Per cent Positive to P.P.D. Only</i>	<i>Per cent Positive to O.T. Only</i>	
Co. "C" P.P.D. 0.0005 mg. in left arm and Co. "B" O.T. 0.1 mg. in right arm at same time					460	12.4	0.2	20.2
Co. "C" P.P.D. 0.005 mg. in left arm and Co. "B" O.T. 1.0 mg. in right arm at same time in children found negative to 0.0005 mg. of the P.P.D. and to 0.1 mg. of the O.T.					280	7.9	1.8	32.8
Co. "C" P.P.D. 0.005 mg. in children found positive to 0.1 mg. of Co. "B" O.T. but negative to 0.0005 mg. of Co. "C" P.P.D.					93	*	20.4	....
Co. "B" O.T. 1.0 mg. in a child found positive to 0.0005 mg. of Co. "C" P.P.D. but negative to 0.1 mg. of Co. "B" O.T.					1	*	....	0.0

* Single Preparation Test

used in making the tests. Satisfactory epidemiological measurements cannot be made with such varying "yard-sticks."

Our findings appear to cast grave doubt not only on the validity of recorded and exploited rates of subclinical tuberculous infection which have been established in different communities for the same period or in one community for different periods of time solely on a basis of results of skin testing with different preparations of tuberculin but also on the significance of findings in two or more communities tested at the same time by the same method with the same dosage and the same identical preparation of tuberculin.

Our first round of routine tuberculin testing comprised 2,126 school children in Giles County and 1,828 in Coffee

County. Those tested are regarded as fairly representative in every way of the total school child populations of the two counties. The tests in both counties were made by the same field force under the same executive direction and supervision with the same preparation of tuberculin (P.P.D. of Co. "A") in the same dosage. A striking finding was that, notwithstanding the very marked difference between the two counties in tuberculosis mortality rates, the tests gave very nearly the same percentage of positives in each of the counties (see Table II). In Giles County 13.8 per cent of the 1,657 white school children and 22.4 per cent of the 469 colored school children tested were positive, and in Coffee County 14.9 per cent of the 1,355 white school children and 19.5 per cent of the 473 colored school children tested were positive. Retests with

TABLE VI

*X-ray Findings in Relation to Reactions to Tests with 0.0005 mg. of Tuberculin P.P.D. of Co. "A" among School Children, by Age and Race, in Giles and Coffee Counties—
"X-ray Positives" Signifying Calcified Primary Areas Unless Specified as
"Clinically Significant Lesions"*

Age-Group in Years →	5-9		10-14		15-19		Totals		Clinically Significant Lesions		
	Number Examined	Per cent X-ray Positive	Number Examined	Per cent X-ray Positive	Number Examined	Per cent X-ray Positive	Number Examined	Per cent X-ray Positive	Primary	Latent Apical	Adult Type
White Children											
Giles County											
Total	455	35.4	722	47.0	480	45.0	1,657	43.2	5	2	4
P.P.D. Positive	37	32.4	105	54.3	86	43.0	228	46.5	1	..	3
P.P.D. Negative	418	35.6	617	45.7	394	45.4	1,429	42.7	4	2	1
Coffee County											
Total	351	0.6	604	0.8	400	0.2	1,355	0.6	..	..	1
P.P.D. Positive	41	2.4	107	0.9	54	0.0	202	1.0	..	..	..
P.P.D. Negative	310	0.3	497	0.8	346	0.3	1,153	0.5	..	..	1
Colored Children											
Giles County											
Total	153	24.2	217	30.0	99	19.2	469	25.8	..	1	..
P.P.D. Positive	14	42.9	51	43.1	40	17.5	105	33.3	..	1	..
P.P.D. Negative	139	22.3	166	25.9	59	20.3	364	23.6	..	..	..
Coffee County											
Total	157	1.3	223	0.4	93	2.2	473	1.1	..	..	1
P.P.D. Positive	20	5.0	42	2.4	30	6.7	92	4.3	..	..	1
P.P.D. Negative	137	0.7	181	0.0	63	0.0	381	0.3	..	..	..

full dosage of both Co. "A" P.P.D. and Co. "B" O.T. of lot 771 showed a considerably higher percentage of positive reactors to each preparation in Coffee County than in Giles County (see Table III).†

Another striking finding was the very marked difference between the two counties in the percentage of school children showing definite X-ray evi-

dence of calcified pulmonary areas of a sort regarded by the authorities generally as unquestionably healed or arrested primary lesions of tuberculosis. In Giles County 43.2 per cent of the white school children and 25.8 per cent of the colored school children, and in Coffee County only 0.6 per cent of the white school children and only 1.1 per cent of the colored school children ex-

† In the course of these studies it was observed, however, that the incidence of 2 to 4+ positive reactions was much higher in Giles County than in Coffee County.

The following table shows the degrees of reaction recorded among 1,657 white children in Giles County and among 1,355 white children in Coffee County resulting from tests with 0.0005 mg. of Co. "A" P.P.D.:

Reaction	Giles County		Coffee County	
	No.	Per cent	No.	Per cent
Negative	1,429	86.2	1,153	85.1
Positive				
1+	89	5.4	179	13.2
2+	59	3.6	12	0.9
3+	70	4.2	11	0.8
4+	10	0.6	0	0.0
Total Tested	1,657	100.0	1,355	100.0
Total Positive	228	13.8	202	14.9
Positives 2+ or larger	139	8.4	23	1.7

TABLE VII

X-ray Findings in Relation to Reactions to Tests with 0.0005 mg. of Tuberculin P.P.D. of Co. "C" and to Tests with 0.1 mg. of Old Tuberculin, Lot 863, of Co. "B" among White School Children in Giles County*

Age-Group in Years →	5-9		10-14		15-19		Totals	
	Per cent		Per cent		Per cent		Per cent	
	Number Examined	X-ray Positive	Number Examined	X-ray Positive	Number Examined	X-ray Positive	Number Examined	X-ray Positive
Total	125	20.8	194	39.2	118	38.1	437	33.6
P.P.D. Positive	6	16.7	29	44.8	21	42.8	56	41.0
P.P.D. Negative	119	21.0	165	38.2	97	37.1	381	32.5
Total	125	20.8	194	39.2	118	38.1	437	33.6
O.T. Positive	29	24.1	75	41.3	41	36.6	145	36.6
O.T. Negative	96	19.8	119	37.8	77	39.0	292	32.2

* X-ray positive signifies Calcified Primary Areas except for 2 pneumonic childhood type infiltrations, one of which was positive to both preparations and one negative to both.

aminated showed such lesions (see Table VI). Thus the incidence of pulmonary calcified areas among school children was over 40 times as high in Giles County as in Coffee County. An interesting feature in this connection is that among the school children in Giles County calcified areas were nearly as frequent among those negative as among those positive to our routine skin testing with P.P.D. of Co. "A." Of the white children positive to P.P.D. 46.5 per cent and of those negative to P.P.D. 42.7 per cent showed calcification. Of the colored children 33.3 per cent of the P.P.D. positive and 23.6 per cent of the P.P.D. negative showed calcification. Of the 2,126 Giles County school children examined, 12 showed pulmonary lesions regarded as clinically significant tuberculosis. Of these 12, there were 7 negative and 5 positive to our routine test with Co. "A" P.P.D. Of 2 children found with clinically significant pulmonary lesions among the 1,828 Coffee County school children examined, one was positive and the other negative to the test with P.P.D. of Co. "A."

Table VII shows a somewhat similar lack of correlation between pulmonary calcification and skin sensitivity to two other tuberculin preparations.

Thus the results of tuberculin testing and those of X-raying of chests were far apart as epidemiological indicators.

DISCUSSION

Our herein reported experience with tuberculin testing in practical epidemiological field studies of the causation of tuberculosis is confusing and disconcerting. It causes us seriously to question the validity of the highly authenticated¹⁰ statement that "the incidence of positive reactors to tuberculin among the children and young adults is the best criterion of the tuberculosis problem in any community." Whether the varying results we obtained from the use of different tuberculin preparations were due to differences in potency or specificity of the preparations or to a peculiar allergy among some of the groups of persons tested to something other than tuberculo-protein in some of the preparations are pregnant questions. We do not know the answers. Neither do we know the significance of the lack of correlation between calcification of lung areas and allergy to tuberculin preparations as found by us in Giles County and by Gass, Gauld, Harrison, Stewart and Williams in Williamson County, Tenn.¹¹

We do not know the significance of the remarkable similarity of percentages of positive reactors to the same dosage of the same preparation of tuberculin administered to young persons in Giles County and in Coffee County notwithstanding the very marked difference

between these two counties in mortality and morbidity rates from tuberculosis. We do not know that any of the preparations of tuberculin we used would not have demonstrated sensitivity in the majority of persons with active progressive tuberculosis in the areas of our studies. We do not know the significance of some of the findings recently reported by other workers with respect to (a) the lack of allergy to tuberculin demonstrated at times among some persons with active tuberculosis,¹² (b) the lack of qualitative specificity of intracutaneous reactions to the purified protein derivatives of the various acid-fast bacteria,¹³ and (c) the difference in sensitivity to tuberculin preparations of different skin areas of some identical persons at the same time.¹⁴

Thus, it appears to behoove us and all others engaged or interested in this field of tuberculosis epidemiology to be humble in our ignorance and diligent in our search for new knowledge.

CONCLUSIONS

1. Skin testing with any of the tuberculin preparations now on the market or otherwise amply available as a sole means of establishing an epidemiological index or rate of incidence of tuberculous infection in the general population of a community or region is of questionable value or definitely futile.

2. Further work, both laboratory and field, by properly equipped agencies, for the determination of reliable standards of potency, specificity, uniformity and stability of tuberculin preparations and for the establishment of reliable standard methods of administration and interpretation of tuberculin tests among persons is highly in order.

REFERENCES

1. *Pub. Health Bull.* Nos. 219 and 225, and *Reprint No. 1797* from *Pub. Health Rep.*, 52, 3 (Jan. 15), 1937.
2. White, William Charles, Seibert, Florence B., Aronson, Joseph D., Reichel, John, Clark, L. T., and Long, Esmond R. *Supplement to the Am. Rev. Tuberc.*, XXX, 6 (Dec.), 1934.
3. Long, Esmond R. *Supplement to the Am. Rev. Tuberc.*, XXX, 6:766 (Dec.), 1934.
4. Gass, R. S., Stewart, H. C., and Gauld, R. L. *Personal Communications* of 1937.
5. Long, Esmond R. *Personal Communication* dated January 24, 1938; and Long, Esmond R., and Seibert, Florence B. *Am. Rev. Tuberc.*, XXXV, 3:291 (Mar.), 1937.
6. Stewart, H. C., Gass, R. S., Gauld, R. L., and Puffer, Ruth R. *Tuberculosis Studies in Tennessee. Am. J. Hyg.*, 26, 3:527-556 (Nov.), 1937.
7. Graham, Dr. A. H. *Personal Communication*.
8. *Pub. Health Bull.* No. 225. pp. 16, 19, and 20.
9. Long, Esmond R. *Supplement to the Am. Rev. Tuberc.*, XXX, 6:766 (Dec.), 1934.
10. Harrington, F. E., Myers, J. Arthur, and Levine, N. M. *Significance of the Tuberculin Test. J.A.M.A.*, 108, 16:1309-1315 (Apr. 17), 1937.
11. Gass, R. S., Gauld, R. L., Harrison, E. F., Stewart, H. C., and Williams, W. C. *Tuberculosis Studies in Tennessee. Am. Rev. Tuberc.*, 38, 4 (Oct.), 1938.
12. McKneely, Thomas B. Paper presented at Annual Meeting of National Tuberculosis Association in Los Angeles, Calif., in 1938.
13. McCarter, Janet, Getz, H. R., and Stiehm, R. H. A Comparison of Intracutaneous Reactions in Man to the Purified Protein Derivatives of Several Species of Acid-fast Bacteria. *Am. J. M. Sc.*, 195, 4:479-493 (Apr.), 1938.
14. Paretsky, M. *Intracutaneous Tuberculin Test. Am. Rev. Tuberc.*, 38, 1:81-95 (July), 1938.

DISCUSSION

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THE paper by Dr. Lumsden and his coworkers presents certain problems in connection with tuberculin testing which have not been raised heretofore. The Mantoux test as applied to human

beings must, of necessity, as compared with tests on animals, require a first dose which will in the most sensitive individuals produce a minimum number of severe reactions. Consequently, the

first intradermal dose of all preparations is low. As a matter of fact, there is no general agreement among workers in this field as to the proper size of either the first or second test dose of tuberculin for the Mantoux test.

The two lots of Old Tuberculin used in this study have been very carefully tested at the National Institute of Health, both in animals and in adult human beings, in institutions in the Washington area. Both lots are very strong, much stronger than P.P.D. or the International Standard. However, when the dilutions are adjusted to produce comparable reactions in the skin of tuberculous guinea pigs, comparable reactions are also obtained in the skin of the adults tested. It is not known if such results could be obtained in the area in which Dr. Lumsden has worked, and such information can only be obtained by trial.

When 1.0 mg. of one of these lots of Old Tuberculin was injected in 173 school children in Coffee County, all negative to a comparatively large dose of P.P.D., 88 per cent reacted, while only 15 per cent reacted to 10 times the first dose of P.P.D. to which they were all negative. Again, in another group of school children, 88.6 per cent were tuberculin positive to the doses used, which we must admit is extraordinarily high. Thus the whole question of the proper size doses for diagnostic tuberculin is reopened. It may

very well be that the degree of sensitivity elicited by a very large dose is not clinically significant and that the dose should be adjusted to miss these very slightly sensitive individuals. Such questions may only be answered by much field and clinical experience and by using tuberculins of approximately equal strength.

The possible importance of the non-specific factor in connection with the high percentage of reactions following the larger doses of Koch's Old Tuberculin must also be considered. When 1.0 mg. is injected intradermally, we must remember that this represents at least 0.01 c.c. of unconcentrated broth. Those of us who have tried to read uncontrolled Schick tests in older children and adults will recall that at times great difficulty is experienced even after 7 days. It would be much more difficult to read these reactions at 48 hours.

The question of tuberculin standardization has been before the Institute for a number of years. The fact that products in the market vary widely in potency has been well known. A national, and new international, standard is now under consideration. Such a standard will equalize the potency of the world's supply of tuberculin but will not determine what the proper test dose should be. Such information may only be secured as a result of much experience with products of uniform strength.

Preparation and Analysis of Diagnostic Antipneumococcus Serum*

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THE preparation of Neufeld antisera has ordinarily followed the method described by Cooper and Walter¹ with respect to dosage and rest periods. Briefly, that method consists of the intravenous injection into rabbits of washed, formalinized suspensions of pneumococci, sedimented from broth cultures, on 3 successive days followed by a rest period of 4 days, repeating the process for 3 successive weeks. Freshly prepared antigen in graded doses is used for each injection. Rabbits may be bled at the end of the rest period following the third series of injections. Studies at the Massachusetts Antitoxin and Vaccine Laboratory² have shown that a stable heat-killed antigen superior to formalinized cultures can be prepared and used with success over a period of several months.

Sera are usually tested for potency by agglutination tests followed by observance of a satisfactory "Quellung" with homologous-type organisms. Cross-reactions are ordinarily detected by observing Neufeld mounts prepared with heterologous types. Although commercial sera we have purchased have been

found generally satisfactory for sputum typing, much time has been lost in typing specimens rich in specific substance, particularly peritoneal washings from inoculated mice, when dilution of the specimens on a trial and error basis has eventually led to the determination of the type. Had our workers had some way of knowing the potencies of the antisera used, expressed in terms readily translatable into routine practice, valuable time and effort would have been saved.

The purposes of this paper are to describe a short method of preparing these diagnostic antisera and to present certain suggestions regarding standardization of Neufeld antisera based upon analytical serologic studies. Our studies have led us to believe that certain pitfalls of the Neufeld reaction, commented upon by Walter,³ will not be overcome until there is advanced a standard technic for determination of serum potency which will make it possible to express the strength of each serum in terms usable by the diagnostic laboratory.

PREPARATION OF SERA

In a previous publication⁴ a short method was described for the production of streptococcic antisera for the

* Read before the Laboratory Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

precipitin reaction. The method has been used successfully in these laboratories for the preparation of many types of agglutinating antisera for diagnostic purposes. When this method was applied to the production of Neufeld antisera for the 30 pneumococcus types, it yielded effective sera with weaker cross-reactions than are obtained through longer methods. By the use of boiled antigens the results obtained were better than those afforded by formalized antigens. In a series of 76 rabbits injected by this method only one failed to produce a satisfactory Neufeld serum. This rabbit, immunized with a formalized antigen several weeks old, yielded a serum of high species-specific agglutinin titer. A description of the method follows:

Broth—Infuse 1 part ground, fat-free beef heart with 2 parts of water over night in the refrigerator. Heat to boiling and press through cheesecloth. Add 2 per cent neopeptone (Difco), 0.5 per cent NaCl and 0.1 per cent dextrose. Bring slowly to a boil, filter through cheesecloth and cotton and adjust to pH 8.1. Bring to a boil and filter through medium grade filter paper. Autoclave at 250° F. for 20 min. For freshly isolated cultures it is advisable to add 1 per cent sterile inactivated human serum after sterilization.

Antigen—Centrifugalize 18 hr. broth cultures of type-specific pneumococci, which have recently been passed through mice, until the supernatant broth is clear. Suspend the sedimented organisms in a small amount of physiological salt solution so that the concentration of pneumococci roughly approximates 20–25 billion organisms per ml. This concentration is routinely effected by measurements of density with the Gates' apparatus.⁵ Pipette the suspension into 1 in. diameter test tubes and place in boiling water for 15 min. The suspension after heating is ready for use as stock antigen. For injection, dilute the stock antigen 1:10.

Injection of rabbits—Inject rabbits in the marginal ear vein following the schedule given below:

Day	Dose
1, 2, and 3	0.5 ml.
4, 5, and 6	1.0 ml.
7, 8, and 9	1.5 ml.

On the 10th day bleed the animals from the ear for a potency test. Rabbits ordinarily show a sufficiently high titer to be bled on the 11th day. It has been our practice to take only 50 ml. at that time followed by injection of 2.0 ml. of antigen and exsanguination after one day of rest on the 13th day. Rabbits can be carried along on "holding doses" and bled over a much longer time to produce a larger amount of antiserum although prolonging the period over which antigen is injected increases the strength and the number of the cross-reactions obtained. Animals which show some but not sufficient response on the 10th day may be given 3 successive daily injections with 2.0 ml. each, following which titers are invariably high enough.

Procuring and preserving sera—Procure the blood by cardiac puncture, place in suitably labeled Petri dishes (15 ml. per dish) and allow to stand at room temperature for 1 hr. Loosen the clot from the dishes with a wooden applicator and store over night in the refrigerator at about 8° C. Remove the serum, clear by centrifugalization, pool with other portions from the same rabbit and preserve by the addition of 0.09 per cent phenolated ether. The preservative is prepared by dissolving phenol crystals in an equal part of ether ("for anesthesia") and should be mixed with the serum by a gently rotatory motion.

DETERMINATION OF SERUM POTENCY

The production of the typical Neufeld reaction is, like other immunological reactions, dependent upon the relative concentrations of antigen and antibody. Within limits, reacting time is also a factor. An antiserum for diagnostic purposes should be standardized in such a way that its potency can be stated on the label in terms which the user can translate into a satisfactory diagnostic technic.

The diagnostic laboratory should have the assurance that an antiserum will react satisfactorily and rapidly in the dosage used with a known concentration of pneumococci. For determining serum potency it is feasible to select a given concentration of a suitable homologous antigen (pneumococci) and determine the minimum dosage of antiserum which will produce a maxi-

num reaction within a period of time not to exceed that routinely used for diagnostic typings. The user of the serum, having been given that information, can apply it to his diagnostic routine by making a rough estimate of the density of pneumococci in materials to be examined followed by dilution of specimens if necessary to keep within the limits defined by the potency of the serum.

The number of pneumococci in a specimen will serve as a measure of the total amount of specific substance only under carefully controlled conditions, but for practical diagnostic purposes it appears to be the only index available prior to determination of the type. The following method of determining this number is suggested:

First manipulate the specimen to render it as homogeneous as possible. A sufficient degree of homogenization can usually be effected by drawing sputum back and forth rapidly into a 2 ml. syringe without an attached needle. Peritoneal washings and broth cultures can be thoroughly mixed by gentle shaking. Place a portion of the prepared specimen of the same volume as that to be used in making Neufeld preparations on a microscope slide together with a small drop of methylene blue and sufficient salt solution to permit the mixture to spread evenly with gentle pressure under the entire area of a cover-slip. Before placing the cover-slip over the mount mix the material thoroughly with a platinum loop. It is important that the mixture remain spread over the entire area covered by the cover-slip and that none be outside of that area. Compute the average number of diplococci per microscopic field (counting the number in the entire depth of each field) after counting several representative fields. The average area of a microscopic field under the oil immersion lens and a 10x ocular lies between 0.015 and 0.02 sq. mm. The areas of cover-slips in common use range from 245 to 625 sq. mm. The number of diplococci in the portion of specimen to be used for Neufeld mounts may then, for practical purposes, be calculated by multiplying the average number per field by a factor obtained by dividing the area of the field into the area of the cover-slip. The values of the factor in round numbers for different sized

cover-slips using an optical system giving 900-1,000 diameters are as follows:

<i>Size of Cover-slip</i>	<i>Factor</i>
18 mm. sq.	20,000
18 mm. diam.	15,000
22 mm. sq.	30,000
22 mm. diam.	25,000
25 mm. sq.	40,000
25 mm. diam.	30,000

A preparation under a 22 mm. square cover-slip showing an average number per field of 10 contains approximately 300,000 diplococci. To provide a satisfactory margin of safety all the diplococci in the preparation must be assumed to be pneumococci of a single undetermined type. The diagnostician must then know that the various sera he uses to determine the type are capable in the dosage used of "quelling" the number of pneumococci found to be present. If he knows the sera lack the necessary potency, the specimen should be diluted to a satisfactory density.

Sera prepared in these laboratories were subjected to serologic analysis by the use of antigen of known density. Mouse-passage strains of pneumococci were used throughout. These were preserved satisfactorily between each series of mouse passages by desiccation under the Flosdorf-Mudd lyophile apparatus. The antigens used for test purposes have been peritoneal washings from mice inoculated with such strains not more than 10 hours prior to autopsy. All tests were made immediately after the washings were obtained to avoid autolysis of the organisms. The approximate density of each antigen was obtained in terms of number of diplococci per ml. by the use of a counting chamber. Antigen of known density and antiserum were mixed in measurable proportions in test tubes and tinged with a small amount of methylene blue in each instance. After standing for 15 minutes at room temperature, a portion of the contents of each tube was placed on a microscope slide and a cover-slip superimposed. Microscopic examination for the characteristic Neufeld reaction and for agglutination was then made immediately. In this way the behavior

TABLE I
Typical Serologic Patterns Shown by Neufeld Antisera
Final Serum Dilutions

		Serum A									
		1:2	1:5	1:10	1:20	1:40	1:80	1:160	1:320	1:640	
Final Antigen Dilutions	Antigen A (310,000,000 per ml.)	1:2	+A	±A	A	A	SA	—	—	—	
		1:5	+A	+A	±A	A	A	SA	—	—	
		1:10	+A	+A	+A	±A	A	SA	—	—	
		1:20	+A	+A	+A	+A	±A	A	SA	—	
		1:40	+SA	+SA	+A	+A	+A	±A	A	SA	
		1:80	+	+	+SA	+SA	+SA	+SA	±SA	SA	SA
		1:160	+	+	+	+	+	+	+	±	—
	Antigen B (450,000,000 per ml.)	1:2	+	+SA	+A	±A	A	A	A	SA	SA
		1:5	+	+	+	+	A	A	A	A	SA
		1:10	+	+	+	+	+	±A	A	A	A
		1:20	+	+	+	+	+	+	±A	A	A
		1:40	+	+	+	+	+	+	+	±	SA
		1:80	+	+	+	+	+	+	+	+	±
		1:160	+	+	+	+	+	+	+	+	+
		Serum B									
		1:2	+	+SA	+A	±A	A	A	SA	SA	
		1:5	+	+	+	+	A	A	A	SA	
		1:10	+	+	+	+	+	±A	A	A	
		1:20	+	+	+	+	+	+	±A	A	
		1:40	+	+	+	+	+	+	±	SA	
		1:80	+	+	+	+	+	+	+	±	
		1:160	+	+	+	+	+	+	+	+	

"Quellung." Therefore, since the amount of capsular substance to be reacted upon varies from type to type, the zone of dilutions in which agglutination will occur without "Quellung" will also vary and has been observed to do so in our studies. For that reason we consider actual observation of the "Quellung" to be a fundamental step in the quantitative evaluation of serum potency. By arbitrarily choosing a standard density for antigens used in potency tests it is possible to make the determination of potency a simple procedure by testing varying quantities or dilutions of each serum against a standard dose of pneumococci.

For simplicity of application to diagnostic work, potency may be expressed as the smallest amount of a serum which will produce well defined "Quellung" of 1,000,000 homologous pneumococci. Potencies for sera prepared by the short method have been reduced to that basis and are given to the nearest 0.0001 ml. in Table II.

tion of cross-reactions should be as dilute as practicable. The following method at least gives assurance that very weak cross-reactions will be detected.

Check the fresh peritoneal washings from a mouse inoculated not more than 10-12 hours previously against a known homologous antiserum. Shake gently but thoroughly and compute the density of the antigen by the use of a counting chamber. Dilute the antigen until a density of 10,000,000 per ml. is attained. Prepare Neufeld mounts using a 1 mm. loopful of the antigen to each three 5 mm. loopfuls of the serum to be checked. Allow the preparations to stand for 30 minutes before examination and observe at least 5 typical pneumococci for signs of the "Quellung."

The density of antigen used in the above method will yield a single diplococcus in every 3-5 fields under oil-immersion lens if a 22 mm. square cover-slip is used. The examination of less dense preparations routinely in large numbers is too great a strain on the microscopist. Even with prepara-

TABLE II
Potencies of Sera Prepared by Short Method
(Amounts Required to "Quell" 1,000,000 Pneumococci)

Type	Minimum Amount in ml. Required	Type	Minimum Amount in ml. Required	Type	Minimum Amount in ml. Required
1	.0023	11	.0071	21	.0001
2	.0006	12	.0063	22	.0012
3	.04	13	.0002	23	.0009
4	.001	14	.0016	24	.0012
5	.0385	15	.0003	25	.0007
6	.0032	16	.0001	27	.0009
7	.0002	17	.0001	28	.0008
8	.0006	18	.0002	29	.0008
9	.0002	19	.0004	31	.0016
10	.0021	20	.0001	32	.0018

DETERMINATION OF SERUM SPECIFICITY

For the determination of specificity the fundamental relation between production of a "Quellung" and the ratio of antibody to antigen in the preparation is of paramount importance. For that reason the antigens used for detec-

tions as weak in antigen as these the experienced observer will occasionally detect beginning agglutination or incomplete "Quellung" which should be checked by further dilution of the antigen. We have observed cross-quellung which could not be detected until

TABLE III

Cross-Reactions in Sera Prepared by Short Method

<i>Serum</i>	<i>Cross with Type</i>	<i>Serum</i>	<i>Cross with Type</i>	<i>Serum</i>	<i>Cross with Type</i>
1	None	11	None	21	None
2	17, 20, 27	12	13	22	None
3	None	13	None	23	16, 32
4	9	14	8	24	None
5	2, 21, 27	15	11	25	10, 20
6	None	16	28	27	None
7	16, 18, 22, 28, 31	17	13, 29	28	16, 27, 29
8	3, 13, 19	18	1, 16	29	10
9	None	19	8	31	20
10	20, 29	20	10, 21, 31	32	23, 27

the antigen was diluted to a point where not more than one diplococcus could be found to every 20 microscopic fields in the final preparation. In our opinion, these cross-reactions, even though very weak, are of importance and may cloud the issue to the disadvantage of the clinician and his patient.

By ordinary methods we found very few cross-reactions in the sera prepared but when the method was refined to the point described above we were able to detect a larger number of cross-reactions, many of which were exceedingly weak. The cross-reactions we have experienced are reported in Table III.

ADSORPTION OF SERA

Heterologous components detected in sera were removed by adsorption by the following method:

Culture pneumococci of the type to be used for adsorption for 18 hours in the broth previously described. Ordinarily the sedimented pneumococci from 100 ml. culture will completely adsorb heterologous antibodies from 60-70 ml. of serum. Centrifugalize 100 ml. of the broth culture in an angle centrifuge at 3,800 r.p.m. for 20 min. and decant the clear supernatant fluid. Add to each centrifuge tube not more than 70 ml. of serum to be adsorbed. Mix the antigen and serum thoroughly and place in a 37° C. water bath for 2 hr. Stir the mixture at 15 min. intervals. (Overnight adsorption in the refrigerator at 8° C. works equally as well.) After adsorption, centrifugalize the serum-antigen mixtures at 4,000 r.p.m. for 45 min.

and carefully remove and save the supernatant serum. Considerable of the phenol (about 80-90 per cent) is lost from preserved sera in this procedure and should be replaced. After adsorption check the serum carefully to determine that heterologous components have been removed.

DISCUSSION

The method of preparing sera described is based upon the theory that, within limits, the production of antibodies depends more closely upon the frequency of applying an antigenic stimulus than upon the amount of antigen injected. An advantage of the method is the comparative specificity of the serum produced. Probably we have detected as many cross-reactions in the sera prepared as are ordinarily detected in sera prepared by the longer methods. However, we believe the technic described for detecting crosses is more delicate than that usually applied since by its use we have found cross-reactions of low intensity in sera from other laboratories distributed by them as specific. About 75 per cent of the cross-reactions we have detected in our sera have been found only by the use of extremely dilute antigens. Heterologous components of such low intensity are easily adsorbed.

Diagnostic antisera for the Neufeld test are ordinarily grouped to make preliminary observations of the speci-

men. Caution should be used in pooling sera which have been adsorbed, since a certain amount of the soluble specific substance will remain in an adsorbed serum. For instance, a Type 15 serum adsorbed with Type 11 pneumococci should not be pooled with a Type 11 serum since the excess Type 11 soluble substance remaining after adsorption will lower the potency of the homologous serum. It is preferable to pool sera before they have been adsorbed, taking advantage of cross-reactions between closely related types in making the pools.

Careful adsorption studies have been made on sera in which two or more heterologous components were detected. In only one instance was it possible to adsorb out one of these components by the use of the other and even then the process was not reciprocal. In this instance, both heterologous components (for Types 23 and 27) were removable from a Type 32 serum by adsorption with Type 23, but not by adsorption with Type 27 which removed only its homologous cross. No other indication that adsorption could be carried out on a group basis was found.

We have observed that antigens in which some autolysis has taken place may fail to react in a Neufeld test although fresh antigens of the same density show a clear-cut reaction. Further, we have observed, under controlled conditions, inhibition of the Neufeld reaction when the organisms were suspended in the bacteria-free culture medium in which homologous-type pneumococci had been grown. That the substance causing the inhibition was probably specific substance in solution is indicated by the fact that it was not present in the unused culture medium or in a medium in which heterologous-type pneumococci had been grown. These observations extend the relationship between the capsule-swelling antibody and the type-specific agglutinin to include

the homologous precipitin. This is not surprising since Heidelberger and Kabat⁶ appear to have established the identity of the agglutinin with the precipitin. The relationship holds some promise that methods of determining serum potency and specificity can be devised which will be more delicate than those we have used. However, until such time as a quantitative study will permit some correlation between the "Quellung" potency of a serum and its precipitin titer against purified specific substance, antigens for use in checking sera should be prepared in a manner which will insure a reasonable degree of correlation between density and capsular substance together with comparative freedom from specific substance in the suspending medium. Standardization of an antigen on the basis of the number of diplococci in a unit volume will be satisfactory in determining serum potency by the method suggested herein only if the suspending medium contains a minimum amount of specific substance in solution since the production of a "Quellung" is dependent upon the presence of an excess of type-specific antibody over that necessary to induce complete precipitation and agglutination, even though these phenomena may be masked by a prozone.

It has been common practice in some laboratories to check for cross-reactions against related types only. We have detected so many crosses between types hitherto not considered related that we feel it advisable to check each serum against all types. We were unable to demonstrate crosses in rabbit serum prior to immunization of the animals in 5 instances in which this possibility was checked. Confining of tests for specificity to the study of behavior of a serum against only a few types will not be scientifically sound until the complicated antigenic mosaic of the pneumococci has received a thorough analysis.

SUMMARY

A short method for the preparation of diagnostic anti-pneumococcus sera in rabbits is described. Methods for the determination of serum potency and serum specificity are presented. An adsorption technic for the removal of heterologous components is given. The methods described for determining serum potency and specificity are based on experimental studies which suggest that the capsule-swelling antibody is identical with the type-specific agglutinin, and that its agglutinogens must be completely satisfied before the characteristic "Quellung" occurs.

REFERENCES

1. Cooper, G. M., and Walter, A. W. Application of the Neufeld Reaction to the Identification of Types of Pneumococci. *A.J.P.H.*, 25, 4:469, 1935.
2. Barnes, L. A. Personal communication.
3. Walter, A. W. Difficulties Encountered in Pneumococcal Type Determination. *A.J.P.H.*, 28, 1:54, 1938.
4. Foote, F. M., Welch, H., West, D. E., and Borman, E. K. Incidence and Significance of Beta Hemolytic Streptococci in Cultures from a Selected Group of Milk Handlers. *A.J.P.H.*, 26, 8:799, 1936.
5. Gates, F. L. A Method of Standardizing Bacterial Suspensions. *J. Exper. Med.*, 31, 1:105, 1920.
6. Heidelberger, M., and Kabat, E. A. Chemical Studies on Bacterial Agglutination. II. The Identity of Precipitin and Agglutinin. *J. Exper. Med.*, 63, 5:737, 1936.

Cleanliness

WHILE various ancient civilizations have left material records of their intelligence in matters of cleanliness for the person, the home, and the city, and in spite of the hygienic regulation of individual and social conduct by religions and dynasties of distant times, the permanent continuous use of

the knowledge of human biology within the structure of civil government is a matter of such recent origin as to be almost contemporary with the present most productive era of the medical sciences. — Haven Emerson, M.D. Medicine and Civil Government. *J.A.M.A.*, Nov. 26, 1938.

Pneumococcus Diagnostic Serum^{*}

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THE typing of pneumococci is rapidly becoming one of the most important functions of laboratories engaged in bacteriological diagnosis; and the successful performance of this function is obviously dependent upon the satisfactory qualities of the diagnostic sera employed. Our experience in Massachusetts made it all too clear that the preparation of satisfactory sera was sometimes difficult and that sera made by even the best laboratories were occasionally something less than ideal. Low potency and lack of specificity were the two stumbling-blocks.

The obvious answer was the setting up of standards for diagnostic sera, and it was hoped that these standards might be made so clearly reasonable and essential that all agencies engaged in the preparation of these sera would gladly adhere to them. Standards established by a federal agency would carry more weight than any proposed by a private organization such as, for example, our Laboratory Section. As the National Institute of Health is empowered by law to regulate the manufacture of biologic products for therapeutic use, a resolution was passed by the Laboratory Section of this Association 2 years ago requesting the National Institute of Health to consider means of regulating

the manufacture of the diagnostic sera.

Since that time there has been much discussion of the various aspects of this problem, and there is every reason to believe that, with the recent issue of Suggested Minimum Requirements for Pneumococcus Typing Serum by the National Institute of Health, we are well on the road to general agreement on the proper solution to it. A description and brief discussion of some of the questions involved may serve to indicate what has been accomplished and what remains to be done.

Certain sera have proved to be unsatisfactory because of low titer, therefore, they must possess a sufficiently high titer; but how high should it be? and how should it be determined? Miss Walter recommended last year a minimum capsular-swelling titer of 1:15 for sera to be used in pools. The tentative recommendation of the National Institute of Health is higher, for it is 1:16 for monovalent sera and 1:8 for pooled sera for all types except Type III. Possibly there is less discrepancy in these standards than would appear at first glance, for the technic described by Miss Walter apparently employs larger amounts of serum in relation to the quantity of sputum.

Inasmuch as the sera will be employed chiefly in the Neufeld capsular swelling method, it would seem better to determine titers by this method than by agglutination. The relative amounts

^{*} Read before the Laboratory Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

of serum and organism must be specified. As a source of organisms, formalinized broth cultures of a turbidity equal to a standard silica suspension are recommended in the National Institute of Health method. Some such suspension must be used, for no laboratory will have at all times sputum samples of all types. I must admit a prejudice in favor of the use of peritoneal exudates from mice, at least for those types which are mouse-virulent, simply because an animal exudate would seem to resemble sputum more closely than does a broth culture.

The specificity of a serum is also of paramount importance. There has been difficulty in the past because certain sera gave reactions with heterologous types of pneumococci more or less frequently. This fault can be recognized by the manufacturer, and remedied by absorption of the serum with organisms of heterologous type, so that it is reasonable to expect and require absolute freedom from cross-reactions.

Because it would be unreasonably laborious to test each specimen against each of the 30 available monovalent sera, it is a common practice to make a preliminary examination with pooled sera. These pooled sera should also conform to the standards suggested for monovalent sera, for otherwise the preliminary examination will be misleading. As the proposed standards apply to pooled sera as well as monovalent ones, this source of error is avoided so long as one refrains from making his own pools from monovalent sera. Indeed, this practice cannot be too strongly discouraged for the process of pooling may dilute at least some of the sera to an undue extent.

Aside from the need for standardized sera, there are other questions worth considering. One of these concerns the best arrangement of types in the various serum pools. It can be shown that if one takes into account the incidence of

the various types, the number of serum-sputum mixtures required for the examination of 1,000 sputa will depend upon how the various sera are combined in pools. From this could be calculated that arrangement of the types in pools which would require the smallest number of serum-sputum mixtures and therefore would require the least amount of effort in the examination of specimens. Unfortunately, however, this optimum arrangement might prove most unsatisfactory in a community where the incidence of the various types did not follow that used in the calculation. Although I am inclined to believe that the allocation of types in pools that is currently employed in the diagnostic sera on the market is not the best, I doubt whether a more permanently satisfactory one can be set up on the basis of our present knowledge of type incidence. Considerable study of type-incidence figures makes it clear that there is so much fluctuation in the prevalence of individual types at different times and places that more figures are required before we try to devise a series of pools more generally useful than the present one. The only point which the available figures make clear to me is that Type I is so generally prevalent that Type I serum is best left out of pools entirely.

In many laboratories it has been customary to examine specimens for the presence of certain types only. For example, most of the typing laboratories in Massachusetts have examined only for the presence of Types I, II, III, V, VII, and VIII. Because some laboratories have been able to assign only 10 to 25 per cent of their specimens to these 6 types we are beginning to feel that they are failing to recognize some organisms of these types. If so, it would be wiser to have all laboratories test their specimens for all types, for they should then be able to get a positive typing on practically every specimen

containing pneumococci. Some of these laboratories do only a few specimens and, as it will be relatively expensive to supply them with sera for all 30 types, we are considering furnishing serum-pools covering all types and monovalent sera for perhaps 6 to 10 of the most common types. When specimens containing pneumococci of the less common types are found, the specimens can be forwarded to a laboratory where all the monovalent sera are available.

Even with such a scheme, pneumococci of undeterminable type will be encountered now and again, for it is generally realized that the present 30 recognized types do not include all the pneumococci there are. It would be desirable if some well equipped laboratory would undertake the study of such strains and solicit the submission of specimens of untypeable pneumococci. Besides increasing our knowledge of this group, such a study would afford a useful check on the general accuracy of pneumococcus typing.

Still another problem to which further attention must be devoted is the finding of two or more types in a single specimen, and the relative importance of each of the types found. Recent papers by Andrewes and by Plummer point out that often one of the types so

found is of more importance than the other, and the general principles involved in deciding this question are fairly clear. Here again more data are needed, and particularly helpful would be figures for the types found in blood cultures and in post-mortem cultures.

CONCLUSIONS

The problems involved in the preparation, standardization, and use of pneumococcus diagnostic sera are gradually being solved. There are still a good many gaps to be filled, and it is only by the collection of further data, based on accurate typing, that progress will be made. The figures most urgently needed are those for type-incidence of pneumococci in sputum and blood cultures, obtained from well scattered geographic areas and covering both typical and atypical pneumonias in the various age groups.

REFERENCES

- Suggested Minimum Requirements for Pneumococcus Typing Serum.* Division of Biologics Control, National Institute of Health, August, 1938.
- Walter, A. W. Difficulties Encountered in Pneumococcal Type Determination. *A.J.P.H.*, 28:54-60, 1938.
- Andrewes, E. T. Lobar Pneumonia in Children. Differentiation of Recovered Pneumococci Into Etiologic Groups and Their Familial Distribution. *Am. J. Dis. Child.*, 54:1285, 1937.
- Plummer, N. The Use of Serum in the Treatment of the Higher Types of Pneumonia. *J.A.M.A.*, 111:694-699, 1938.

Is the Private Health Agency on the Way Out?*

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CHANGE is the order of the day for private health agencies. It is important that they realize this now and prepare themselves for the inevitable. Every private agency must now begin to analyze frankly and as objectively as possible, its functions, accomplishments, and objectives. The change in economic trends—a tendency toward higher taxation, and fewer large fortunes—is certain to increase the difficulty of collecting money to finance private health work. The public will become increasingly critical and insistent upon private health work being done with the highest degree of efficiency on an intelligently organized basis that will permit of neither friction nor duplication.

Three major developments which have taken place recently, will have an effect on the future of voluntary health work. One of these three events was the allotment of Social Security Funds to the U. S. Public Health Service for its own, and for the work of local and state health departments, and in addition, special funds for such purposes as venereal disease and cancer control. These allotments of federal funds have already permitted expansion of tax supported health activities to a limited de-

gree. They represent perhaps the first step in what seems to be the direction we are bound to go, namely the strengthening of tax supported agencies.

The second event was the National Health Conference, held in July. One of the significant recommendations submitted, which has received relatively little publicity because of the overshadowing controversy surrounding medical care plans, was for increased federal funds for state and local public health departments and for hospitals and medical service to the indigent sick. This recommendation seemed to have the almost unanimous approval of delegates attending the epoch-making conference. Perhaps still more to be noted is the fact that the American Medical Association at the September meeting of the House of Delegates in Chicago, concurred in the proposal for more government aid for public health work, mental hygiene education, and care of mental patients, tax supported subsidization of tuberculosis hospitals, more facilities for the care of convalescent patients, and the establishment of a federal department of public health, with its head a member of the Cabinet, group hospitalization, and cash indemnity against sickness.

In view of the readiness with which Congress voted Social Security funds to the U. S. Public Health Service to aid state and local health departments,

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and special funds for venereal disease and cancer, it seems almost certain that this part of the National Conference program will go through, if not during the coming year then before many more years have passed. The strong pressure for a Department of Public Health in the Cabinet seems likely to be successful. Obviously, if this program moves forward it will strengthen the tax supported health agency and the tax supported hospital.

Meanwhile, the depression has put a check on the increasing number of large fortunes, and the trend toward higher graduated income and other taxes has reduced the ability of the rich to give to private health work. These are actualities. They are things that are taking place and of which we must take cognizance.

Curiously enough, there is a contrary trend in one field of health activity—namely, that of the private hospital. One of the most extraordinary developments in recent years in this country has been the building up of hospital service plans. Starting only 7 years ago with one small plan in Dallas, Tex., there are today at least 100 large cities which have hospital service insurance actually in successful operation, covering 3,000,000 subscribers. The endorsement of the hospital service idea by the American Medical Association at its meeting of the House of Delegates held last month, can mean only one thing—the hospital service plan is certain of rapid expansion.

In the opinion of the best informed students of the problem, this is bound to have the effect of strengthening the situation of the private hospital. Private hospitals that have been in a precarious financial situation during the depression will find the assurance of payment for service which comes out of the hospital service plan, perhaps their salvation. However, while strengthening one phase of their work and easing their financial

problem, this does not mean that their field of service itself is not likely to be affected. With increased public funds for tax supported hospitals of general, as well as those of special type, it would seem reasonable to believe that more and more of the free patients are destined to go to the public hospitals and more of what have been the part-pay patients to the private hospitals.

It is significant that this very trend toward the build-up of tax supported health and hospital work is due in part to the efforts of private agencies and leaders in voluntary health work to that very end.

Local tuberculosis associations, health councils, nursing organizations, and similar health agencies, public spirited physicians, and laymen all have joined hands with leaders in tax supported agencies to bring about this result. It is an accomplishment of note and a tribute to the unselfishness and to the vision of these men and women. Many of the voluntary agencies are quite ready to place under the microscope the present functions of their agencies and make such adjustments as may be necessary and desirable. Many have already accepted the logical theory that when a tax supported agency can take over its work, the private agency steps out of that field and into another if warranted, or it ceases to operate and these agencies will not be unprepared for the next step.

Let us consider for a moment what some of these changes are likely to be. Hospitals for free patients, clinics, medical service in the homes of the indigent sick now carried on by voluntary agencies are likely to become less necessary as tax supported funds increase. This will not come about in a moment because the lack of adequate service is now so universal that for some time to come there will be needed all of the service of this kind that can be provided by voluntary and tax supported groups combined.

Private agencies will need to devote more of their time and energy toward community planning so that all of our forces may be working together more effectively, with well defined objectives. Their functions will become more and more research, education, building citizen interest and support, pioneering in new fields where the public agency may not be ready to enter, and coördinating public and private programs. This means an increasingly important rôle for the Health Council idea in the local, state, and national fields. Voluntary agencies will continue to have a responsibility for helping to see to it that tax supported funds are well spent and that functions taken over by those agencies are efficiently performed.

There is really no occasion for leaders outside the tax supported health field to have any concern as to the continued importance of their work. It is rather a matter of elasticity and adjustment. Everybody in the public health field knows that so much remains to be done, that we fall so far short of using effectively the instruments that medical science has placed at our disposal for combating disease, that the combined public and volunteer health forces will be needed for years to come. It must all be properly integrated and the private agency must see the changing picture and be ready to modify its rôle.

True, there is reason to believe that the private agency cannot look forward to as great an expansion now as it has had during the past several years. Money will not be so readily available in the form of contributions and donations. There will be less to give, and through the very fact that more is being done out of tax funds there will be more resistance to giving. Therefore, progress in the field of voluntary health agency work will depend less and less upon an increasing amount of money, and more and more upon doing the job as effectively as

possible with what we can get. As private giving becomes harder, donors will demand better organization on our part and the elimination of duplication or even anything that appears like duplication or waste.

We might just as well recognize it now that there must be a complete and frank analysis of the set-up of our private health work in relation to public health activities and its relation to the total program. This will lead, if we follow our course logically and honestly, to the need of some eliminations, some combinations and certainly more centralization of functions. It may be that we are facing the time when we shall have to combine all of our private health work of an educational nature in each local community into one centrally directed organization. Certainly, there is much to be said in favor of the proposal that more can be accomplished with the same amount of money if there is such a centrally directed organization with many subdivisions to do the job of education, program planning, and service.

Are the private agencies on the way out? The answer is—Yes and No. Two classes of agencies may be on the way out, those which have served their purpose or are doing what logically is the responsibility of a tax supported agency, and which therefore ought to cease to exist or change their function, those whose executives fail to see their place logically and to act unselfishly and with vision to change their rôle and adapt themselves to the needs as they exist. An agency which has lost the quality of adjustability has probably lost a considerable degree of usefulness. Those private agencies on the other hand, which are performing an essential fundamental service, which see the picture with clear eyes, which are ready to face the facts as they are, will find a part that they can continue to play usefully for many years to come.

Is There a Place for the Voluntary Health Agency in View of the New Public Health Activities of the Federal Government?*

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THE question raised in the title of this paper is, in my opinion, the public health equivalent of the larger political question: "Is fascism around the corner?" It openly challenges a democratic principle for which the voluntary health agency has sweat and fought. The challenge is warranted, for never before have such sweeping commitments been made by our federal government as those resulting from the Social Security Act.

A page or two of the history of the voluntary health agency may help to define its position and philosophy. How did it come into being? For almost a century after the birth of our Republic, organized health protection of the people was practically nonexistent. Generally speaking, we, the people, intent on subduing frontiers, passed over lightly our greatest national asset, the health of the people. The Constitution made no specific provision for health protection and legislative bodies showed little initiative in that direction. Driven into

action by sporadic epidemics, governing bodies did, here and there, set up emergency measures, some of which gained permanence and became the nucleus of health departments. Lone pioneers such as Shattuck of Massachusetts and Stephen Smith of New York did stir the state into action, however reluctant, but who will deny that prior to the Civil War public health protection in this country barely existed?

Modern public health activity came into being largely through the stimulation of independent citizen groups. The organization of the tuberculosis movement furnishes an example. Thirty-five years ago when practically no effort was made to curb the endemic tuberculosis, certain leaders, medical and lay, speaking unofficially for the people, determined to create the machinery necessary to combat tuberculosis. They realized that what was necessary were diagnostic facilities, public health nursing, sanatoria, and other expensive services, and that these innovations could be won only by popular demand. Today we see abundant testimony to their faith and vision; the state supervises and carries the major burden of the vast, intricate system of controlling

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tuberculosis. It all came about through the pressure of public opinion, organized by voluntary health agencies, who made use of education, demonstration, and social engineering. The job of tuberculosis associations is far from being finished, but they have, thus far, definitely and firmly implanted the principle that the state owes its citizens protection against tuberculosis and at the taxpayer's expense. Venereal disease control, maternal and child hygiene work, public health nursing, and numerous other services now accepted as branches of the health department were similarly initiated by voluntary health groups. There is nothing novel about this practice—it is the American people's way of getting what they want from their government. Theoretically, the Constitution provides all necessary instruments for self-government, but experience has proved them to be unwieldy and necessity has mothered the invention of less cumbersome methods of voicing public demand.

Everyone grants that health protection is the first duty of the state. The ballot is supposed to be the magic wand that makes the state perform according to our wishes, but the ballot alone is utterly incapable of securing for us the blessings offered by modern medicine. Consider this situation: We, the people, value health above all else, yet until recently we have been content with a very mediocre brand of health service for which we were willing to pay no more than about one cent per week per capita. How can we explain this paradox?

In the first place, intelligent desire has not until recently been keenly awake. Desire for an unaccustomed service must be aroused before it is wanted.

Secondly, democracy in action is unwieldy. Between the simple desire of a farmer in Iowa and its fulfillment are uncounted baffles, honorable and other-

wise, to say nothing of trickery and political conniving.

The situation is further complicated by the dizzy speed of medical progress. Laws and practices based on scientific knowledge of today are likely to be obsolete tomorrow. The march of medical knowledge has been so rapid during the past two decades that application in terms of practical measures usually lags far behind.

And, finally, the sciences on which public health is based, particularly medicine, are highly specialized. How should the people know what to ask for? Their official representatives are not usually of the type who can be expected to hand them something for which they do not ask and which they do not themselves fully appreciate or understand.

For these and other reasons we need an informed and organized opinion, expertly led and free from any partisan commitment. The gap between what a self-governing people should have and what they actually get is a wide one which the voluntary health agency strives to close. Such an agency is in effect the conscience and the voice of the people on matters pertaining to public health. The victims of tuberculosis, for example, are greatly in the minority and cannot speak effectively for themselves. Moreover, the potential victims of tuberculosis hardly know what threatens them, but their unfelt needs too must be given voice. The voluntary association formulates these needs, hears these "prayers, spoken and unspoken" and when it expresses them clearly and effectively enough, the state takes heed. The voluntary health agency of the past hardly needs defense.

THE NEW ERA

We are entering a new era—the whole social and political fabric is rapidly undergoing change. In the past we

have thought of our government primarily as constituted authority, austere and commanding even though self-imposed. Pomp and circumstance, uniforms and monumental trappings have fostered this attitude in spite of the fact that we boast of government by the people. Now, in the face of economic distress and enlightened by a broader social vision, we are beginning to think of government as the *service arm* of the people. Government exists not merely to govern, to police us, but to do for us collectively what we cannot do for ourselves singly or in small groups. Parenthetically, I do not believe this newer attitude will revert overnight with the next political turnover, for its roots strike far deeper than current political propaganda. The ball, whose momentum was greatly accelerated by the Social Security Act, will continue to roll along swiftly, which means, among other things, that the protection of public health through governmental agencies is going to expand and become increasingly powerful; and when all that can be done for the protection of public health is being done by government, what further need have we for the voluntary health agency?

More need than ever!—unless we are going to be supinely content to leave to official appointees certain privileges we have cherished in the past. Vast sums of money apportioned to bureaus means a concentration of power in their hands. This increased power need not frighten us; on the contrary, we should take pride in the expansion of service for the common good. But there is no guarantee that the new, expanded bureaucracy* will always be a wise and benevolent one. Bureaucracy is constantly threatened by certain deteriorating influences. One is that the bureau is often tempted to assume arbitrary

power like that of a dictator—it may even become arrogant. At the other pole is the danger that the bureau may become complacent—for governmental procedures tend to become formulated or canalized, and once having worked out a scheme of procedure the bureaucrat is tempted to follow the path of least resistance, and easily falls into a rut. The only safeguard against these and other evils of bureaucracy is eternal vigilance of the people who create the bureaus; and the voluntary health agency stands guard for them.

To think of the voluntary health agency only as a watchdog, however, would be deplorable. Its larger function is to give the people an opportunity to participate, at least in the determination of broad policies. In this country we love and need the soap box, the public forum, the free press. Take away the opportunity to discuss political and social problems, and we move a step nearer the totalitarian state. What government, through its experts, does *to* and *for* the health of the people may be good, but what the people themselves do voluntarily upon their own decision is probably far better. Without the voluntary health agency we are more or less committed to let hired agents do our thinking and planning while we accept submissively the measures they devise for our supposed good.

Experience has shown, too, that a health officer can move forward no faster than the people are willing to follow. And when they do not understand they refuse to follow. Understanding on the part of the masses comes through the tedious process of discussion, persuasion, promotion, and demonstration. How slow, for example, has been the labor of breaking down the prejudice against venereal disease control. But evidently the job of education has been well done, for the American Institute of Public Opinion (which correctly predicted nearly all important

* The terms bureaucracy, bureaucratic, etc., are nowhere in this paper used in a derogatory sense.

elections in recent years) assures us that "Seventy-seven per cent of the people are in favor of free treatment for all venereal disease patients, regardless of their circumstances." Think, therefore, of the voluntary health agency as the people's forum through which citizens become interested, help to shape policies, and willingly coöperate with the technicians we call health workers. Can we afford to lose so valuable a tool of democracy?

The fact that public health procedures are becoming more and more complex is all the more reason why we should preserve this forum. In many instances the scientist (health officer, doctor, administrator) is aware of the technical aspects of a new medical discovery but uncertain, perhaps, as to its social application. For example, a health officer may know about the experience of other countries with the use of BCG in preventing tuberculosis but the question in his mind is "Is this form of vaccination applicable in my district?" He needs a public sounding-board. The man on the street cannot answer him, but a voluntary health agency, representing the people, and which has studied the question not only technically but also socially, can be of great assistance to him in his decision. In fact, without such an agency, he is obliged to make the decision on his own account and thus we surrender to arbitrary governmental power one more item of policy determination.

Finally, those who complacently folded their hands when large sums of money were made available through the Social Security Act for public health development are due for a shock. This money can be put to work in the local community only upon demand. While some funds are available from the federal treasury without strings, most of it is secured only if matched by the local or state treasury. In other words, the people have to *ask* for the service and,

what is more, they must be willing to *share* in the expense. Without a voluntary health agency, how is the local community going to get the full benefit of the Social Security Act? We cannot leave the task alone to officials already harassed by tax-reduction leagues.

Nor can the voluntary health agency yet afford to give up its function of blazing new trails. No matter how well a health department is fortified with money and power, legal restrictions often prevent it from experimenting with, or introducing, a new measure. The voluntary health agency with its greater freedom can often open the way.

FUTURE OF VOLUNTARY AGENCY

Most certainly there is a place for voluntary health agencies! Unoccupied by them, that place will invite the fascist whose creed is efficiency through dictatorial power. But if the voluntary health agency is going to fill that place, some thorough-going house-cleaning is in order; there is furniture in its halls that is obsolete. The tendency of some voluntary health agencies is to cling to projects or services which have pleased the public in the past, long after the need for them has been satisfied. There is other furniture which properly belongs to the official agencies. In principle, enlightened voluntary health agencies have followed the policy of turning over to official agencies such measures as the association has initiated and carried on as a demonstration, once their value has been proved. So long as a service cannot or will not be supplied by government the voluntary health agency, perhaps, has the right to supply it. But there is little excuse for a voluntary health agency clinging to a program of work which is official or technical in nature and which the official agency would carry on if properly asked. A dog-in-the-manger attitude seriously hinders health progress. Now that more abundant funds are available

to health departments, voluntary health agencies which insist upon duplicating activities of the health department will be on the defensive.

The voluntary health agency must also look to its internal organization. Does it truly represent the people and is it qualified to speak authoritatively on public health questions? There are all too many dilettantes on the boards of directors. Serving as an officer because one's psychiatrist has advised that "welfare work will take you out of yourself" may be good treatment for that individual—but not helpful to the cause of public health. When the voluntary health agency is actually led by leaders, spokesmen of the people, responsible citizens who take the time and trouble to understand the project they are promoting, it commands the respect of the people and of the officials and law makers.

To visualize the relationship of official health departments to voluntary health agencies one might compare the health department to the railroad trunk line and the voluntary health agency to the supplementary auto truck service. The railroad is admittedly the carrier of the heavy load, but it runs on rigid tracks along a pre-determined route, a route which leaves some newly developed areas uncovered. The auto service with its greater flexibility and freedom, not bound by strict schedules, is able to penetrate into remote frontiers and byways, inaccessible to the railroad. Each supplements the other. The mistake some voluntary health agencies make is to try to run parallel to, or even in competition with, the official agencies. When the voluntary health agency loses its initiative, imagination, easy mobility, it becomes an obstruction to progress.

Looking into the future one can perhaps visualize the voluntary health agency as a broad, mobile Citizens' Committee on Health. Its function will be

to stand by and to support the health department in every emergency, but it will not assume any of the health department's work. It will not be specially consecrated for all time to any given health problem, but it will be interested in the sum total of health welfare. Yet, it may see fit to place emphasis, as time and opportunity warrant, on whatever detailed problem needs attention. It would be somewhat like the National Guard, able to mobilize its forces quickly, now here, now there, according as the emergency might demand.

A Citizens' Committee on Health, absolutely free of politics, could voice public opinion otherwise throttled by the vested interests. It would help protect the good health officer against manipulation of the "machine" and help to force out the incompetent one. It would make health administration more flexible by furnishing a quick and ready means of voicing public sentiment.

The committee would consist of untrammelled citizens who have taken the trouble to verse themselves in health matters and, therefore, would be regarded as the health conscience and the health voice of a community. Not only would this group be competent to speak but also to act when for any reason the official arm of health fails to function. There is no reason why such a health association could not step into a breach and furnish a specific health service just as is done now, but always with the expectation that in due time the activity would be adopted by the health department.

An objection to the Citizens' Committee on Health is that its aim is too intangible for the ordinary man; the multitude are not interested in public health in the abstract—they will contribute liberally only to a health cause that is dramatized. Tuberculosis, cancer, syphilis—these are fighting words. The broad public health concept lacks dy-

namic power—for some it is no more exciting than a Yorkshire pudding. For national agencies it may be expedient, therefore, to continue the pattern of the past, namely, voluntary agencies for the promotion of specific causes, such as maternal and child hygiene, the prevention of blindness, syphilis control, etc. Such specialism has proved its value in the past. Those chosen to lead voluntary health agencies want and should have specific objectives. Likewise the public is interested in the concrete rather than in the abstract. Of course, health agencies with a specific purpose will have to coöperate with each other; an active alliance and a working give-and-take arrangement is essential. Competition between voluntary health agencies is absurd and suicidal. And all health agencies must, if they wish honestly to promote the cause of health, support the broad program of public health. The National Health Council is a token of the earnest endeavor of national health agencies to work together and we may hope that the new social trend will bring the fine idea back of the National Health Council into full flower.

From the standpoint of local community organization, unification of all voluntary health enterprises seems most sensible. A score of agencies each promoting its specialized work such as the control of syphilis, of cancer, of tuberculosis, means confusion in the public mind and often a deplorable competition between agencies. Were the health department to be similarly dismembered into its several bureaus a storm of protest would arise. Unification of specialized voluntary interests need not, however, be at the sacrifice of the special interests, for a generalized health association may have as many subcommittees as necessary. Cities that have tried the health federation idea can testify to the efficiency of the scheme. Yet, to keep interest in special

fields alive, it may be well to maintain national and state health agencies devoted to some one limited field. Such agencies can afford to employ specialists, produce materials, give expert leadership and so on, all of which would be available to the health committee in the local community when needed.

One other question to which I have no answer is: What shall we do for money? Can the public be interested in the kind of voluntary health agency which does not function by performing charitable deeds but which plans, supports, promotes, and voices demands? Here is a challenge to the health educator. This troubled world now furnishes abundant evidence to show that the populace can be roused to support with fanatic enthusiasm the most vague and absurd concepts. Shall we admit that the same power cannot be invoked to rally them in support of objectives that are sound, even though somewhat abstract?

In summary, I would say that there is a definite place for the voluntary health agency, rightly conceived, in spite of the fact that government promises an expanded public health program. The voluntary health agency is needed not only because it advances us on the road to health but, what is even more important, because it is an instrument of democracy which we need now more than ever before. Self-government is weakened by too much concentration of power in the hands of appointed officials. Freely do we admit that the totalitarian state, unhindered by the interference of citizens' committees operates with efficiency (railroads in Italy run on time) but what Americans appreciate more than all else is freedom—the right to govern themselves. Freedom that is license is a dangerous thing to give into the hands of the people. But freedom that is a self-imposed discipline is the essence of democracy.

The State Public Health Nursing Unit and Its Relation to Special Services*

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THE efficiency of any complex organization depends primarily upon the provision for administration of its component parts, and particularly for the assignment of responsibilities to each unit or part. Therefore, a discussion of the state public health nursing unit and its relation to the special services requires that consideration be given to these factors. As public health programs are made up of a variety of special programs most of which need public health nursing services, the state public health nursing unit is confronted with the responsibility of promoting and coördinating types of nursing services demanded by these special programs. These programs are directed toward particular diseases or conditions, such as tuberculosis, venereal disease, orthopedic conditions, maternal and child health, and so forth.

The need for nursing services to aid in the development of public health programs was recognized by state departments of health long before provision was made to unify the nursing direction of these services. This is understood, when one recalls that practically all state public health programs

are the result of the development of one service at a time. This gradual development of different special programs, the degree of emphasis placed on each program as a result of special appropriations, and the efforts to incorporate the various special services into a general health program influenced the employment of public health nurses by state departments of health. The increasing numbers of nurses who were employed to participate in these expanding programs ultimately focused attention upon the need for a unit within the state health department that would aid in coördination of the public health nursing activities. Acceptance of the desirability of unifying the nursing direction of state public health nursing services gradually followed.

Considerable variation exists in the present state provisions for the administration and nursing direction of public health nursing services. A review of the existing provisions for state nursing direction of public health nursing activities as compared with the situation in 1931 shows that there are four main types of provisions and that there has been a substantial increase in the establishment of separate divisions or bureaus of public health nursing. According to information published in the November, 1937, issue of the *Health Officer*, the four main types of pro-

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visions for the administration and nursing direction of public health nursing services in state health departments as of January 1, 1937, were as follows:

A separate bureau or division of public health nursing

A public health nursing unit under central administration

A public health nursing unit under local health administration

A public health nursing unit under a division of maternal and child health

It was also possible to obtain from the U. S. Public Health Service information which to date has not been published. This information shows numerically the present situation according to the four classifications mentioned. It shows that a separate bureau or division of public health nursing is functioning in 26 states, an increase of 17 over the number in 1931. The public health nursing unit functions as part of the central administration in 6 states, an increase of 4 since 1931. The public health nursing unit functions as a part of the unit of local health organization in 5 states, an increase of 2 since 1931. The public health nursing services function as part of the division of maternal and child health in 14 states. This is the only one of the four types of organization that have shown a decrease, a decrease of 10 since 1931.

The trend, therefore, is definitely toward the establishment of a public health nursing unit which will be administratively responsible within state departments of health for the direction and promotion of public health nursing services. The rapid increase in the provisions for separate public health nursing units since 1931 makes it appear obvious that state public health administrators are depending upon the public health nursing units to provide a service which is fundamental in the development of their programs. It naturally follows that under any form of administration the public health

nursing director should work in a close relationship to the directors of the programs of special services and to the director of local health services, for it is the need for adequate public health nursing services to assist in the programs of these divisions that determines the function of the state public health nursing unit in relation to the special services. Each director of these special programs requires an amount and kind of public health nursing that will contribute most to his program. This requirement obligates the state public health nursing unit to perform a function which is different from that of any other administrative unit in state departments of health. This function is to provide a service which is required by different special programs and to coordinate these services into a smooth functioning general health service.

In order that the state public health nursing unit may meet its responsibilities most efficiently, it is essential that the director of a state public health nursing unit participate in the total program planning of a state department of health. Moreover, such participation is particularly important in relation to program planning of each division or bureau that requires public health nursing. Recently, a state director of public health nursing stated that she was not familiar with the entire plans of the state department for the promotion of maternal and child health services. She appreciated the value of being fully informed but, unfortunately, since she had not been requested to participate in making the plan as it related to nursing, she had taken it for granted that the state health officer would not be interested in having her become familiar with the entire plan. The state health officer later expressed surprise that this had not been brought to his attention before. It is through mutual understanding of objectives and plans that the chances for united efforts

are promoted. A state nursing director who understands the needs and implications of public health nursing in the special programs and who is informed as to the availability of needed services, as well as the potentialities for extending adequate nursing services, can contribute valuable assistance in program planning in state departments of health.

It is logical to expect that the staff of the state public health nursing unit will not only give assistance with program planning but will follow this by an advisory service in regard to the nursing phases of each special program.

The assignment of a public health nursing consultant for the purpose of promoting unity of plans and action by the state public health nursing unit and the division which represents the special field for which this consultant is prepared, provides a channel of working relationship between the units or divisions involved. It also tends to lessen a general feeling, on the part of the directors of special programs which require nursing services, that unless definite provisions are made for direct nursing assistance, the nursing services are not always adequate in amount and kinds in a special field. Such state consultative nursing service should be easily and readily available to state directors of special programs, and its influence must permeate the state-wide field nursing services. Locally the consultative nursing service should function through the directors of health programs and the generalized supervising nurse. It should reflect a knowledge and understanding of the whole health program as well as of the accepted principle of rendering public health nursing services on a family-health basis. The degree of success of this consultative service depends in part upon the policies of working relationship, and the extent and ease with which these policies are made to function.

From incomplete reports sent to the U. S. Children's Bureau, it was learned that 66 consultant nurses are functioning in the 51 state and territorial departments of health. The special services represented by this group of 66 consultants are tuberculosis, venereal disease, orthopedics, and maternity. It is known too that some states employ a consultant nurse to function in each of the four special services mentioned and a few states provide more than one consultant nurse in some of the specialties. Therefore it is obvious that the assistance of state nursing consultants has not been provided in all the 51 state and territorial departments of health.

In certain states several generalized supervisors have been provided by the state departments and an effort has been made to include among them certain supervisors with advanced preparation in different specialties, notably tuberculosis, venereal disease, and maternity. The directors of the public health nursing units in some of these states have found that it has not been possible for these state supervisors with preparation in different specialties and with responsibilities for generalized supervisory services, to contribute the necessary amount of assistance in their special types of service. Under this arrangement, conflicts constantly arise between the general supervisory responsibilities on the one hand and the advisory and educational responsibilities which are required for the development of special services.

The rapidly expanding programs directed toward special diseases or conditions, the increase in the numbers of public health nurses who are employed to participate in these programs, the lack of adequate preparation of many of the nurses in these special services, and the acceptance of the principle that efficient public health nursing is best rendered on a family-health basis,

have brought out rather forcefully two points of view as they relate to the special services. On one side, the division directors who are promoting special programs are insistent in their efforts to have specialized nursing assistance, and on the other side the field nurses who are rendering health services from the family point of view are equally desirous of having nursing supervision which reflects an understanding of the entire general health program. There must be found a satisfactory middle path. The needs are—(1) provision for sufficient generalized supervisory nursing services plus (2) provision for educational and consultative nursing services according to the special programs which are being promoted.

The functions of generalized supervising nurses and those of state consultant nurses are interrelated, but they are not interchangeable. The activities of one complement those of the other. The main function of the local generalized supervising nurse is to direct and perfect into a family-health service the performance of local nurses. The demands of family-health services require that attention be given to various special services. Therefore, the preparation of generalized supervisors should include a thorough basic knowledge of the various special services; otherwise it will not be possible for them to assume continuously the responsibility of directing the public health nursing in the various programs.

The main function of state nursing consultants is to assist the director of the state public health nursing unit to interpret special programs of those divisions which require public health nursing, and to develop nursing technics and procedures required by the special programs in order that these may be rendered within the framework of family-health services. The director of a special program is responsible for the

content of the program and for designating the particular places where emphasis is to be placed. State nursing consultants should have a thorough knowledge of public health nursing and advanced preparation in the special services which they represent, otherwise they cannot function with conviction on the public health nursing phases of a particular specialty. The assistance of state consultant nurses should be made available concurrently with the promotion of a special program, provided sufficient generalized supervisors are available to carry the local responsibility and to work with the state consultant.

The program in certain specialized fields, particularly that for the eradication of tuberculosis, has been in operation over a comparatively long period, therefore, the service needs are fairly well understood by generalized supervisors. The best results in the public health nursing phases of tuberculosis programs have been attained, however, where the generalized supervisors have been sufficiently well informed in regard to this clinical specialty so as to meet the daily responsibility for improving and extending the local nursing activities.

Recently, attention has been centered on other programs, notably that for the prevention and correction of crippling conditions. Increased efforts in any program necessitate that consideration be given to the requirements of the program. For example, the program for the prevention and correction of crippling conditions is administered in many states by an official state agency other than the state department of health and, because active participation in this program is an accepted function of public health nursing, the need for satisfactory working relationships between the directors of this special service and the state public health nursing unit is apparent. In programs directed toward crippling conditions, as

in those directed toward other diseases or conditions, the gap between the needs of the program and the needs of the local generalized nurses must be bridged, and by provisions which will promote the efficiency of local and direct nursing services.

In some states, the official agency which is administering the program for crippled children's services has appointed a state consultant nurse. One of the functions of this worker is to promote suitable working relationships between the director of the program and the director of the state public health nursing unit in order that program needs and professional services, as the latter relate to public health nursing, may be correlated and made more effective. In other states, provision has been made for a state orthopedic consultant nurse who functions as a member of the staff of the state public health nursing unit. Under either arrangement the aim is to extend the volume and to improve the quality of public health nursing according to the requirements of the special program.

The increased availability of better prepared field nurses and of adequately prepared generalized public health nursing supervisors, who function in a unit which lends itself satisfactorily to good generalized supervision, may change some of the methods of procedure of state nursing consultants. For the present, however, their function is to render expert educational and consultative services in regard to public health nursing phases of the programs of special services. It is quite conceivable that eventually state consultant nurses will be able to devote more time than is now possible to research in the nursing phases of a particular speciality, and in this way may make even greater contributions toward improving and perfecting public health nursing in special services.

The relation of the state public

health nursing unit to the special service rests then upon certain fundamental factors. One is the administrative provisions within the entire structure of state departments of health. The trend is to establish a separate unit or division of public health nursing that will be responsible administratively for the activities of the unit and for directing and coördinating public health nursing in amounts, kinds, and quality, as needed by special programs. Satisfactory working relationships between the state public health nursing unit and other divisions or units, on the one hand, and other state agencies which require public health nursing for the promotion of their special programs, on the other, naturally must be developed if the state public health nursing unit is to participate in program planning, and, particularly, planning in relation to the special programs, such as tuberculosis, orthopedics, venereal disease, maternal and child health, and so forth.

The assistance of state public health nursing consultants who have had advanced preparation in selected clinical specialties makes possible a continuous educational and consultative service in relation to the nursing phases of special programs. This consultative service on public health nursing phases of the special programs should be available to the state and local directors of health programs and to the local generalized supervising nurses. However, as nursing direction and guidance of public health nursing activities are strengthened through adequate provision for competent generalized supervisors, it seems quite logical that more attention should be given by specialized consultant nurses to intensive and continuous study of the nursing phases of the various services. This type of activity is necessary in order to find new ways to further and to perfect the relation of the public health nursing unit to the special services. The plans of the state

public health nursing unit should reflect a practical but liberal view of what it is possible to accomplish within a given period. They should also reflect a full appreciation of the advisability of preparing and assisting generalized supervising nurses to perform their function

of guiding and perfecting the direct nursing services. In the last analysis, the efficiency of the state public health nursing unit in relation to the special services will be judged by the extent, variety, and quality of the direct nursing services.

Saving Life by Teaching

IN the past there has not been wanting a supply of men and women willing to devote their lives to research into the causes and cure of disease. To devote oneself to educating one's fellows into right ways of living calls for just as much devotion and perhaps even greater self-sacrifice. The research worker has the added incentive that perhaps one day he will be acclaimed as a discoverer, the originator of a new and effective cure. The propagandist

cannot look for any such reward. It is a foible of human nature that when once a man is taught, he likes to feel that he has found it all out for himself.

But it is just as good a thing to save men's lives by teaching them how to save themselves, as it is to discover a new serum which will save them willy-nilly.—James Fenton, M.D., Presidential Address, Society of Medical Officers of Health, Kensington. *J. Roy. San. Inst.*, 59, 5 (Nov.), 1938.

Laboratory Administration as Regards Syphilis Serology*

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IT is with a feeling of considerable concern that an attempt is made to discuss the subject of serology in syphilis in an abbreviated fashion. The ramifications of the subject are so numerous and so diverse, and the purely technical aspects are so important, that there is a great danger of becoming lost in a maze of detail which would entirely fail to be informative to a group interested in administrative health work. There are, however, several general aspects of the subject which may be scrutinized with profit by the health officer.

On the wave of popular interest recently engendered by the movement looking toward the control of syphilis, the diagnosis of the disease has assumed a new importance. The history of this movement will ultimately be written in the laboratories of the country as surely as the history of an armed conflict is written by those actually engaged in combat. The search for the trail of syphilis now reaches all classes of society, whereas in the none too distant past the level of suspicion seldom reached above the dispensary class. The enactment of laws requiring sero-

logic examination in premarital and prenatal instances places an even more trying burden upon the public health machinery, and renders it imperative that stock be taken of the methods upon which dependence is placed in assuming the added responsibility, and of what can be done to make this foundation more firm and reliable.

The present equipment for the serodiagnosis of syphilis consists of tests based upon two biologic phenomena. The first group is made up of the direct descendants of the original Wassermann, which utilize the complement-fixation principle of Bordet and Gengou as an indicator. The second group represents the practical application of the phenomenon of precipitation or flocculation originally described by Michaelis. Both types of tests are considered to be capable of measuring the same substance in the blood serum, the so-called reagin or Wassermann substance. Both types of tests may be considered as somewhat empirical, since there is at present a lack of precise knowledge as to the nature of the Wassermann substance. There is some evidence that it may be a normal constituent of the blood altered or increased through the agency of spirochetal or disturbed metabolic activity. The basic specificity of the methods,

* Read before the Health Officers Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 26, 1938.

however, gives rise to the belief that the tests are a measure of a true antibody response.

In America there is a group of test procedures bearing the names of their originators, namely the Kahn, Kline, Hinton, and Eagle flocculation methods, and the Kolmer and Eagle complement-fixation methods. There are several other distinctive technical methods sponsored by organizations as represented by the New York State complement-fixation test. All of these procedures, if carefully carried out and interpreted in the light of clinical experience, are capable of guiding an acceptable routine of syphilis work. From a clinical standpoint they do not entirely cover the field, but they represent the best practical application of the present state of the science of serology.

At rather frequent intervals new tests appear in the literature, usually accompanied by the claims that they are equal to the established methods, and have the added and important advantages of simplicity in performance and interpretation. As a rule these procedures, and the claims made for them, may be disregarded by the health department laboratory until such time as they have been thoroughly evaluated against clinical evidence and by comparison of results with more firmly established methods. Generally these tests are based entirely upon some minor technical modification which does not make any significant contribution to the knowledge of serology.

With the flocculation tests special preparation of the antigen, variations in the concentration of the antigen emulsion, and changes in the physical conditions of the test mechanics have the effect of increasing the sensitivity of the procedure. This has given rise to the exclusion or presumptive tests. As a result of the increased sensitivity, the specificity of the tests is interfered

with, and the methods are advocated by their originators as being significant only when frankly negative. The inference is that, if these procedures fail to detect the presence of the Wassermann substance, a more specific, but less sensitive procedure would, in all probability, be negative. Positive findings must be confirmed by other methods. Practically, the methods are used for the purpose of detecting or screening out the bulk of the frankly negative sera, thus reducing the number of specimens which are tested by the more burdensome, but more exact, methods.

It is generally considered that two tests are more satisfactory than one and many clinicians prefer one complement-fixation and one flocculation method. In some laboratories this idea is expanded into a group or battery of tests being carried out on each serum, the final answer being based upon the group of findings, rather than upon the results of any one test. The results of a routine of this type are of questionable advantage over those produced by one or two carefully conducted test procedures. Any superiority in results which may accrue to the use of a battery of tests does not seem to justify the increased requirements in personnel and physical equipment.

It has been previously stated that any of the American methods are capable of producing a high standard of sero-diagnostic results. This assertion must be entirely predicated upon a complete and rigid adherence to the technical precepts advocated by the originator of the method. The maintenance of adequate control of any biologic method requires adherence to prescribed rules and any liberties taken with the technic are ultimately reflected in a decline from the standard of results which the method may be capable of producing.

In this connection it is safe to state that a considerable proportion of the

public is at present being served by methods which do not conform to a standard or sponsored technic. Many of these procedures, especially complement-fixation tests, have been in use for years without any attempt being made toward modernization and many of them are basically incapable of modernization. They produce an indifferent level of results and will continue to do so until replaced by a more adequate method. There can be no greater inducement for accepting a standard procedure than the opportunity which is afforded the laboratory of cross-checking its results with other laboratories utilizing identical methods. Such interlaboratory checking is at present of limited value because so few serologists are content to adopt and adhere to rules prescribed by the several originators of acceptable procedures. Adherence to standard methods means, too, that firmly established improvements can be readily and speedily incorporated, thus keeping the technic abreast of current serologic advance.

Further in this connection there is a definite tendency on the part of operators of serologic technics to alter or modify the method with which they are working. Not infrequently these changes are trivial, representing some whim or fancy of the operator, introduced for personal convenience. Not infrequently, too, technical modifications are forced upon the serologist by failure of administrative officials to provide adequately for the work. In the final analysis, either type of technical deviation from a standard method ultimately works to the detriment of the service rendered the patient whose blood is being tested.

From the administrative standpoint the selection of the personnel charged with the operation of the method is comparable in importance to the selection of a standard method. Technical

pitfalls which may lead to erroneous results are always present, and can be guarded against only by the vigilance of the director of the laboratory and the scientific training and integrity of those actually engaged in the work. The selection of personnel, hampered as it is by employment restrictions and low salary levels, constitutes an important administrative problem. Both basic scientific training and supervised experience are essential. The formal education should consist at least of training in the exact and biological sciences. The supervised experience must be a variable factor, dependent upon the adaptability of each trainee, but it should embrace training in the broad aspects of serology rather than in a single test method.

In the formal type of work which health departments are obliged to do, the method of reporting becomes important. The recommendation of the League of Nations Conference in regard to the use of the terms "Positive," "Doubtful," and "Negative," is probably the most helpful to the average medical man. Many clinicians engaged in active syphilis work desire only the actual readings of the test. The method of the future probably lies between the two; that is, advising the physician of the actual readings together with the originators' interpretation of the degree of positivity displayed. In sections of the country in which there is a prevalence of malaria, the establishment of a consultation service within the health department would seem to be desirable. The interpretation of results into terms of actual syphilis should not be imposed upon the laboratory.

In maintaining a serologic routine at an acceptable level of efficiency, four types of cross-checking appear to be needed. The first consists of an intra-laboratory check between the several methods in use. The second consists of

an inter-laboratory check in which identical methods are used in each laboratory. Access to a clinical material of sufficient size to serve as a clinical check is the third, and the fourth consists of participation in the annual evaluation check which is offered to all state laboratories and in which the findings of each participating laboratory are compared directly with those of the originating serologists. A check system of this kind will tend to display any variations from the expected levels of specificity and sensitivity.

It seems evident that one of the most important functions of state and municipal serologic laboratories must be the assisting of local laboratories to attain high standards of serologic performance. In so doing the state and municipal laboratories must serve the local facilities much as the originating serologists now serve as evaluating agencies to the states. State laboratories should recognize their inability to guide others in a field in which their own performance is not entirely proficient and this type of service may well be delayed until the work in such laboratories has attained a demonstrable level of efficiency which warrants an assumption of the rôle of a measuring stick of satisfactory performances.

A final point of interest to the health officer is the use of serologic methods in surveys and studies designed to determine the incidence of syphilis. The first requisite is that the serologic methods to be used be placed upon a high technical plane and carefully checked against an established control laboratory. Not a few painstaking efforts along this line have been rendered valueless through poor serology, faulty collection and transmission of specimens, and disregard of the clinical background of cases in which positive find-

ings are recorded. A recheck of these cases is essential as is also a clinical survey of a sufficient number to afford an estimate of the influence of co-existing infections. Attention to these details is a prerequisite to the utilization of serologic findings as an index to prevalence.

CONCLUSIONS

Thus, if any message may be left to administrative health officers, it would be that there is available a group of test procedures which represent the best of the present knowledge of serology.

That these methods are sponsored by investigators best situated to improve or to alter their respective tests, in order that the technics may be kept abreast of current thought.

That if a standard or sponsored technic is adopted, it should be carried out as closely as possible in accordance with the recommendations of the author.

That new test procedures should be adopted only after they have been thoroughly tested in clinical work.

That there are in use at the present time a number of outmoded technics which are probably not amenable to modernization, and which are capable of producing only an indifferent standard of results.

That personal modifications introduced into a standard method to suit better the convenience of the operator, or to fit the test more readily to the routine of a laboratory, may well be discouraged.

That the caliber of the work in a state or municipal laboratory should be high enough to serve as a guide to the work being done within the state.

That the results obtained in surveys should be scrutinized carefully as to their value as an index to prevalence.

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LEPROSY IN THE UNITED STATES

ONE hears little now about leprosy in the United States, though it is still a scourge in too many parts of the world. Barbarities such as the shipping of unfortunate lepers in boxcars from one state to another, no one state being willing to receive and harbor them, are not heard of any longer, though they have occurred fairly recently and within the recollection of many readers of this *Journal*.

The annual report of our National Leprosarium at Carville, La.,¹ deserves more than casual notice. At the close of the fiscal year, June 30, 1938, there was a smaller number of patients remaining than at any time within the past seven years. This was partly due to the greater number of deaths, of which there were 35 among active cases, and one in a paroled case. Of those who died, 39 per cent had suffered from the disease for 10 years or more. It is encouraging to note that there was a continued lowered admission rate. There were for the year a total of 59 admissions of whom 32 were new patients, the others being absconded patients who returned, paroled cases in whom the disease became reactivated, etc. From the standpoint of nativity, only 9 states were represented by new patients and only 18 are now represented in the hospital. There were during the year 1 admission from Hawaii, 3 from the Philippine Islands, and 1 from Puerto Rico, and a total of 32 from these areas were present in the hospital. There were 20 admissions from 7 foreign countries for the year, making a total of 108 patients in the hospital from 21 foreign countries. As usual, there were more men than women, 243 of the former and 106 of the latter.

One of the main duties of the laboratory is the examination of the patients monthly for the bacillus of leprosy, as it is one of the chief criteria for the consideration of parole. Only after a failure to find the organism every month for a period of one year are the patients allowed to go out on parole. Those showing improvement are examined at monthly intervals while the stationary or retrogressing cases are examined at longer intervals.

An interesting piece of work which is going on is the routine Kolmer, Wassermann, Kahn, and Kline tests on each patient on admission. The laboratory is

attempting to repeat the work of Acosta, of Colombia, who has reported that an extremely large percentage of patients gave a positive complement-fixation test, using an alcoholic extract of a bacillus isolated from the blood stream of a patient as antigen. It is not felt that any report can be given at this time as much more work is required before a decision can be arrived at.

The patients are given every comfort and, while a certain number abscond for one reason or another, there are many others who regard Carville as their home and wish to return. All outgoing mail is sterilized. During the year there were some 135,624 pieces of mail handled. Twenty-six magazines and 9 daily papers are received regularly for the patients' library. For the blind patients there are radios, baseball supplies, soft balls, etc., for their amusement, bought from the patients' benefit fund. There is also a dance orchestra, which is paid from this fund. Altogether, the report seems encouraging.

Just why there is so much public terror over leprosy has never been quite clear. It causes terrible deformities, and was for many years considered incurable. Doubtless, however, some of the unreasoning fear of it has come down from biblical times. It may be said with certainty that syphilis is now much more of a menace to civilization from every standpoint than is leprosy. Is it too much to hope that this *Journal* will be able to report at a time not too far distant that there are only some 500 cases of syphilis in the country?

REFERENCE

1. *Pub. Health Rep.*, Nov. 18, 1938.

MARY MALLON

THE death of Mary Mallon, known all over the world as "Typhoid Mary," occurred on Friday, November 11, at the Riverside Hospital, North Brother Island, New York, at the age of 70 years. Her story carries many lessons. For 31 years she has been under the surveillance of the medical authorities through no fault of her own. Many of her last years were spent in a detention hospital to which she was first committed on March 19, 1907. During all these years she was a menace to her fellow men, although entirely innocent of any wrong doing, and like the leper of old, she was branded "Unclean." It is not strange that she was bitter and defiant, and sought legally to escape from detention and to dodge the health authorities, in which she was too often successful, and in this she was reprehensible.

She was the first known typhoid carrier of the United States, and her detection was due to the unusually fine piece of epidemiological work done by George A. Soper, Consulting Engineer, and a Fellow of this Association. At the time of her detection in 1907, she had been the cause of seven outbreaks, with 26 cases of typhoid fever during 7 years. In the course of her career, 30 other cases were believed to be directly, and one probably indirectly, due to her—a total of 57, among whom there were 3 deaths.

There is some reason to go to this extent into the details of her case, since the newspapers very generally have been giving the Germans credit for the discovery of the typhoid fever carrier. The first record we have of typhoid carriers and their danger to the community was given by Horton-Smith, in England, in his Goulstonian Lectures, in 1900. He stressed the danger of the chronic urinary carriers, and called attention to their etiological importance. In November, 1902,

Robert Koch gave his famous address on the subject. At that time there was a great deal of typhoid fever in Southwest Germany, including Trier, the Bavarian Pfalz, and in Alsace-Lorraine—so much so that they were a menace to other parts of the country through migration. Koch pointed out that the chief source of infection to others was the patient and the convalescent, and urged that patients should be made sterile before release. He considered ambulant and abortive cases of great importance. Under his directions bacteriological stations were set up, the first one at Trier, in 1903, under Frosch. The investigation revealed that the intestinal carrier was the most important because the most frequent, and for the first time the suggestion was made by Frosch that the typhoid organism might be capable of leading a prolonged saprophytic existence in the intestine. In 1904 Drigalski proved this hypothesis. His work also showed the significance of atypical typhoid fever in children and went further to establish the dangerous importance of ambulant, abortive and unrecognized cases.

In the last quarter of a century in this country typhoid fever has dropped from a leading position as a cause of death to one of minor importance.* We have been warned by Dublin and Lotka that this brilliant victory over typhoid fever may lull us into a feeling of false security as the disease still causes a great many deaths in certain areas. In the United States it is most prevalent in the larger villages and smaller towns, with less than 10,000 inhabitants. From 1930 to 1932 the rate in these small communities, for whites, was 4.2 per 100,000 against 3.6 for rural areas, and 1.9 for the larger cities. Among the colored, it was 17.5 per 100,000 for small places, 13.6 for rural areas, and 6.3 for the larger cities.

This advice is emphasized by the recent report of endemic typhoid fever in the Department of the Gironde, France. Although the local water supplies, especially in the rural districts, are in many cases unsatisfactory, the zone in which the supplies are best controlled shows the largest number of cases. The inevitable conclusion is that endemic typhoid fever in this district is due to some other factor than the water supply. In the United States unquestionably the purification of the water supply and vaccination have been the two factors which have led to its great reduction.

That the carrier problem is still to be reckoned with is clearly shown by a recent report from the State Department of Health of New York. In 1937, there were 398 typhoid carriers under supervision in the upper part of New York State, exclusive of those in state institutions. This was an increase of 18 over the number for 1936. Twenty-nine of these were discovered through the study of outbreaks and three outbreaks of the disease were traced to previously unrecognized carriers. One has only to glance over the indices of the current journals and note the number of outbreaks due to carriers in institutions as well as the general population.

There is no need at this time and place to go further into the history of Mary Mallon, which has been given in considerable detail and accuracy in the public press. It is good to note that in later years she lost much of her bitterness and lived a fairly contented if necessarily restricted life. She always refused the one operation which might have cured her. When she was declared a carrier she

* For Metropolitan policy holders the death rate for 1935 was 1.1 per 100,000 as compared with 22.1 in 1911. The rate was slightly higher for the general population.

dropped most of her friends and never revealed the story of her life or origin. She evidently found consolation in her religion and all are glad that she is now at perfect peace in the bosom of the church to which she gave her faith and loyalty.

ENGINEERING SERVICE IN HEALTH DEPARTMENTS

FOR the past decade all but four or five of the least populated states have had engineering divisions in their state health departments, while in municipal health departments only one-fourth of the 211 cities with a population of 50,000 or over, employ engineers, and less than 40 per cent of the 37 largest cities of the United States with a population of 250,000 or over, have one or more public health engineers in their health departments.

It is of interest to note, therefore, the announcement appearing elsewhere in this issue that a new organization known as the "Conference of Municipal Public Health Engineers" was formed at the Kansas City meeting. Such an organization should stimulate better engineering procedures through an exchange of ideas and opinions among its members, and by meeting on the day immediately preceding the annual meeting of the American Public Health Association, should increase the membership of the Engineering Section of that body. While the state sanitary engineers are wrestling with standards and fundamentals and attempting to direct engineering programs on a broad scale, the municipal engineers are faced with detail problems of promoting and enforcing specific sanitation programs. The type of problems, therefore, facing these two types of public health engineers, while fundamentally similar, are actually quite different.

There seems to be quite a definite need for this Conference of Municipal Health Engineers and we wish them all success with their new organization.

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Many advertisers, especially those asking for mail responses, weigh every detail which might lead a reader to hesitate even slightly before writing or sending in a coupon.

In the health field every pamphlet or folder, every mimeographed sheet we would like people to ask for, might well carry the price, or "a copy free upon request." Thus every copy carries its invitation to any accidental reader anywhere. State publications might add: "... in this state" or "... in this city."

Let's Do Something about It—The problem is stated in *Safety Education* (National Safety Council, Chicago):

The Education Division wishes to fill all requests for safety material in so far as

possible. It is difficult, however, to respond to letters that ask simply for "safety material," since so many different kinds are published. Persons writing for material are asked to state specifically what is wanted, so that their requests may be filled promptly and correctly. Lists of available material may be obtained from the Education Division.

Probably all sources of health information receive many similar indefinite requests.

Whenever writers, teachers, editors, public health workers, and others, print, mimeograph, or speak, and mention an address as a source for health education "material" could we not urge that those who use the information tell who they are, what use they have for the material, whether they are teachers or students or what, and *give the date when any event or time of use is dated.*

Will the compilers of printed or mimeographed lists of sources please include some such statement?

How to Prepare Sound-film-strips—Or, talking slide films as they are also called. Full working details on preparing the script and selecting the photographs are given in "Preparing Sound Film Strips," by C. R. Thomas. *Educational Screen*, 64 E. Lake St., Chicago, Ill. Oct., 1938. 25 cents. (If you go in for projection material, or for visual education in the schools you will wish to subscribe to *Educational Screen* at \$2.00 a year.)

No quotation from the article would be worth while. The whole of it needs to be read and studied.

* Please address questions, samples of printed matter, criticism of anything which appears herein, etc., to Evart G. Routzahn, 130 East 22d St., New York, N. Y.

"Please Send Me—"—An article by C. R. Read in *Bulletin*, Am. Society

for Control of Cancer, 1250 6th Ave., New York, N. Y. Nov., 1938.

From September of 1935 to September, 1938, 49,006 letters were received, a large proportion of them requests for information, each one with overtones of fear or despair or hope. None of these letters goes unanswered. Where general data on cancer are requested, standard pamphlets are sent out at once. If the request is for medical help, as it often is, the writer is promptly referred to the local chairman of the society or a member of the cancer committee of the State Medical Society. When the letter outlines a "sure and positive cure," the society explains that it has no authority under its articles of incorporation to test such methods of therapy and refers the writer to the local medical society.

What people ask for, and the varied uses for the answers, are described.

Collective Thinking—A group of health workers is gathered to consider possible uses of some new graphic material.

After an explanation of the material and its availability, the question is asked: "What use can be made of it?" or "Dr. Jones, what is your idea as to how to use this material?" Others volunteer or are called upon. One starts with a lay audience. Someone else suggests use with some professional group. Another person proposes a plan for promotion or advertising the material. Then back to a professional group. And the hop, skip, and jump of individualistic thinking continues.

In contrast: the chairman asks what professional health, nursing, and medical groups might be interested?

Then how and where would they be reached, and how should the graphic material be made up. That brings collective thinking, all members of the group concentrating for a few minutes on that specific problem.

Then the chairman asks if the material would be usable with lay groups. After a quick affirmative the questions of how and where are taken up. The

collective thinking thus concentrated on one phase of a problem brings rich results.

All of this disposed of, the chairman inquires as to the promotion of the uses thought to be acceptable. And time is given for any overlooked angle.

Thus time is saved and group thinking has registered various uses, and there has been opportunity for all to express their opinions on the ideas submitted.

Is not collective thinking better than the hop, skip, and jump technic?

For Newspaper Beginners—"50 Hints for Obtaining Newspaper Publicity," by National Tuberculosis Assn., and probably available free through state and local tuberculosis associations.

Elementary instructions are stated quite concisely in 50 paragraphs. All are quite according to Hoyle, except that No. 1 sets quite a task for the newspaper man.

"Get acquainted with reporters, departmental editors, *et al.* Ask them for suggestions as to the type of material they want, the manner in which they want it prepared, and when they must have it."

We have had to listen too often to newspaper men agonizing over the effort to explain to uninformed audiences what the editor wants and how it should be prepared.

Would it not be simpler and easier for both parties for the tuberculosis worker to take the copy, the information, or the ideas he has to the editor, and ask what to do about that specific material? (Especially in view of the publicity ideas and ready made copy supplied to many locals by the state associations.)

On Factory Bulletin Boards—A fairly common type of poster bulletin board has been widely introduced for displaying safety warnings. The Chicago Tuberculosis Institute (360 W.



HOW ARE YOU?

- * Just how well are you? Are you physically able to enjoy the winter months to follow?
- * Now is the opportune time for that fall check-up. Regardless of age or occupation everyone should have a complete health appraisal.
- * See your doctor now! Have a thorough physical examination including a chest X-Ray and a blood test.
- * This will facilitate the correction of minor defects and abnormalities before serious illness results.

THE TUBERCULOSIS INSTITUTE
OF
CHICAGO AND COOK COUNTY
200 N. MICHIGAN AVE., CHICAGO

Christmas Health Seals Support Our Work

Michigan Ave.) provides a monthly letter size sheet headed "Health Flashes." Some 7,850 copies go to about 815 industries.

Another sheet, "Man-Power," "health news for industrial management," goes to executives and foremen, 3,100 copies a month.

This service has run continuously since August, 1930. Both sheets are illustrated on this page.

Medical Supplements to Newspapers—That we do not get to see much material that is issued gets emphasis from the quotation below from *Journal of A.M.A.* (Nov. 12, 1938). These tabloids did not come our way for mention in the *Journal* and display at the next convention.

Two county societies have recently collaborated in the publication of medical supplements in their local newspapers. On October 25 the Nassau County Medical Society, Mineola, N. Y., published a health section of 48 pages in the *Nassau Daily Review-Star* and on October 30 the Wayne County Medical Society, Detroit, published its second annual medical supplement in the *Detroit Free Press*. Both supplements were profusely



Health News for Industrial Management
PUBLISHED EVERY MONTH BY THE CHICAGO TUBERCULOSIS INSTITUTE
No. 97 OCTOBER 1938

FACTS ABOUT HEALTH AND SICKNESS

"Every year 70 million sick persons lose more than one billion days from work."

"Workers in industry have a life expectancy approximately eight years less than non-industrial workers."

"For respiratory tuberculosis, the death rate among unskilled workers is seven times as high as for professional workers."

"In 27 iron and steel towns, the death rate from pneumonia is two-thirds greater than in the United States as a whole."

"A million workers are exposed to the hazards of silicosis."

"Health supervision is inadequate in most industrial plants employing 500 or less workers; representing some 62% of the working population."

"On the average day of the year, there are four or more million persons who are temporarily or permanently disabled by illness, - unable to work, attend school or pursue their customary activities."

"Among gainful workers, there are on the average probably ten days of sickness disability - in the course of a year - but these disabilities range from a day, a month, a year, to a lifetime."

(Reprinted from "The Unserviced Millions" by Helen Hall & Paul Kelliege in Sept. (1935) Survey Graphic)

A HEALTH SERVICE FOR YOU

In the interests of better industrial health The Tuberculosis Institute of Chicago and Cook County has enlarged its Speaker's Bureau to include special health programs for industrial employers and employees.

Motion pictures, silent and sound, graphically describing many phases of the tuberculosis problem are available upon request. Lectures, too, embodying important facts about tuberculosis and other industrial health problems will be presented to your group by outstanding public health authorities.

These two services are available, free of charge. We suggest you write for descriptive folder. Please send requests to Speaker's Bureau, The Tuberculosis Institute of Chicago and Cook County, 300 North Michigan Boulevard, Chicago.

EARLY DIAGNOSIS AND THE JOB

(Excerpt from article by Roland Hosen, Director, Rehabilitation Service, National Tuberculosis Ass'n.)

"Tuberculosis should no longer be thought of as necessarily fatal or permanently disabling. When discovered in its earliest stages it is definitely curable."

"In the employment market, wages and salaries are paid not according to need, but in recognition of what the applicant has to sell."

"Early diagnosis is a major contribution to the rehabilitation of the tuberculous because it lessens the number of occupational cripples."

CHRISTMAS SEALS PAY FOR OUR WORK

illustrated and the editorial content was of a high order. Both were published in tabloid form with original front-page layouts, the Nassau society using an interesting arrangement of photographs and the Wayne County society using an original drawing. Not only were the activities and functions of the local societies and the American Medical Association described in both supplements but a wide variety of interesting articles on all phases of medicine and health were used. Such supplements, properly prepared—as these two were—provide an excellent medium of public education in matters vital to health of the individual.

How Bulletins or House Organs Are Mailed—The paragraphs below indicate a diversity in practice which suggests that a detailed inquiry might be worth while.

Why are certain practices followed? When is one method better than another? If second-class privileges are good for some, how may others get the same privilege when desired?

Could a committee of Public Health Education Section make the study? It would not be much of a job.

The paragraphs which follow cover a part of the periodicals received by this department. It ignores those issued by national agencies, and those distributed under frank through coöperation with the U.S.P.H.S. Both printed and mimeographed issues are included.

Among those which send their monthly or weekly bulletins by second-class mail: state departments of Connecticut, New Jersey, New York, Ohio, Virginia.

Mailing bulletins under permit number, Sec. 526, P. L. and R.: California Industrial Accident Commission, West Virginia Tuberculosis and Health Assn., Iowa State Dept., Colorado Springs Dept.

Paying straight one and one-half cent postage: National Health Library, and city departments of Albany (using stamped envelopes), Belmont (Mass.), New York, Rochester.

Using postal meter: West Virginia State Dept.

The following do not use envelopes or wrappers: West Virginia Association, Belmont City Dept., state departments of Connecticut, Iowa, New Jersey.

Of the above group: Belmont fastens the fold with a sticker, Iowa fastens with a stamp, using one cent postage a copy, Connecticut, West Virginia, and New Jersey mail with pages unfastened.

Stencils are used in addressing all bulletins listed above, except Albany and Virginia, which are typewritten.

Health Education in 30 Cities of 250,000—The Department of Health of New York City has announced a 3 year project in neighborhood health education activities.

Philip S. Broughton, who conducted the recent nation-wide syphilis educational campaign for the U. S. Public Health Service under Surgeon General Thomas Parran, will head the new project.

The new project will be closely identified with the work of the department's Bureaus of Public Health Education and District Health Administration, and will be guided by

an Advisory Committee of which Commissioner Rice is chairman and which includes outstanding leaders in the public health field.

Mr. Broughton, until he was appointed to this new post, was in charge of the Office of Health Education of the U.S.P.H.S. Previously he had been in various governmental positions. Prior to entering government service in 1933, Mr. Broughton was on the teaching staff of the Department of Government at Dartmouth College for 2 years; he held a Cowles Fellowship in government at Yale University; he taught at the College of the Pacific, Stockton, Calif., following his graduation from the University of California in 1927. He is 34 years old, married, and has two children.

Two health centers of divergent characteristics will be chosen as testing grounds for conducting district health education and for establishing and extending health education methods which will be generally applicable to all districts. These centers also will be used for training of personnel within the district, as headquarters for health education seminar and discussion groups, and for observation of health officers from other districts.

Headquarters' personnel for whom a period of district observation and activity seemed useful could be brought to the training districts for brief periods, especially those whose work, although conducted at headquarters, has a particular relationship to district activities.

Assistance and guidance will be given to district health officers in developing their local health programs, of which the following procedures are indicative:

1. Spreading information to the leading people of the neighborhood about special district health problems, what scientific medicine offers for their solution—how they can help other people to understand these matters.
2. Producing health education material needed locally.
3. Organizing periods of intensive district education on important health subjects.
4. Visiting physicians to acquaint them with health district resources and to ascertain district health education problems known to physicians on which they may wish assistance or feel that community work is needed.
5. Stimulating the use of the most effective methods of individual education.
6. Keeping the District Health Education Committee and the School Health Education Committee informed regarding health education needs and activities and utilizing their assistance.
7. Helping in the health education of patients and their families.

8. Assisting in organizing meetings and other educational activities for physicians.

9. Supplying teachers with approved health education materials.

10. Providing a district information service on health education.

11. Assisting in the building and maintenance of a health education reference file for health center and other district workers.

This new project will utilize

... the Health Department's rapidly developing plan of District Health Administration of 30 health districts, each with a population of about 250,000 and each eventually to have the full-time service of a qualified district health officer responsible for the public health administration within the area. In 9 of these district new buildings are in use and 4 additional units are under construction.

Reaching 25,000,000 People —

How exhibits are used to that end is reviewed briefly in "Looking at Health," by Thomas G. Hull, exhibit specialist of the A.M.A. *Hygeia*, 535 N. Dearborn St., Chicago, Ill. April, 1938. 25 cents.

More than 25,000,000 people annually attend state and county fairs, community expositions and neighborhood carnivals in this country. In one of those years when a world's fair occurs, as it does at irregular intervals, millions more are added to the attendance record. But whether 800 persons go to an obscure county fair, or 800,000 to a state fair, or 8,000,000 to a world's fair, all of them go to see what they can see. Some are bent on pleasure alone; some are looking for specific information, but all of them are looking. Such ready-made audiences in receptive moods offer opportunities of which health educators have been taking advantage for many years.

There are three methods of absorbing health information—by listening, reading, and just looking. The lecturer, whether from the platform or over the radio, employs one method; the magazine, book or pamphlet offers a second means; the exhibit, if it is properly presented, employs all three.

Looking at a well prepared exhibit is a delight and repays a visitor for his time and trouble in coming. An especially attractive exhibit will bring a person back time and again just for the thrill he receives from looking. The message that is presented, of course, must be readily understandable, without a great deal of study and wondering.

Listening to the demonstrator tell about the exhibit adds much both to the enjoyment and to the knowledge of the visitor. The task of demonstrating is a difficult one, requiring aptitude and stamina. Many mediocre exhibits have been made outstanding successes because of the initiative of the demonstrator. More than once has such a person "stolen the show."

Reading the written material that accompanies the exhibit gives still further details of information. The more intriguing the exhibit, the more will the visitor read labels and legends, seeking out every scrap of information obtainable. Then there are those industrious persons who come with notebooks and pencils, spending an hour or more in the exhibit copying everything. For their benefit the American Medical Association introduced and often uses "exposition files" with visual indexes. So popular were these files at A Century of Progress Exposition in Chicago that the first set was worn out and had to be replaced before the summer was half over.

The visual impression gained from "looking" is the primary factor in the exhibit. It is gained without mental effort, and it is lasting. The show is a success or a failure according to the result of the visual impression.

A Talking Slide Film — "The Nurse's Responsibility in Saving Sight" is offered by National Society for Prevention of Blindness, 50 W. 50th St., New York, N. Y.

Emphasis is placed throughout upon the close integration of the eye health program with the general health activities common to all fields of nursing. The health of the eye is presented from prenatal life to old age.

The scientific facts on which eye health is based are correlated with the suggested program. The Society presents it in the belief that schools of nursing, staff education groups in hospitals and public health agencies, and nurses' associations will find it a valuable supplement to other teaching materials.

As an educational device the talking slide film has many advantages. "The Nurse's Responsibility in Saving Sight" consists of 120 still pictures on a film strip synchronized with a double-faced record carrying a lecture addressed to nurses. As the film strip and record are completely separate, they may be interrupted at any point to permit discussion—thus giving the advantages of a series of slides with the addition of a lecture in the

form of a phonographic narrative. Running time is 30 minutes.

The complete production—film and record—can be purchased from the National Society for the Prevention of Blindness at \$5.00, plus transportation. It is also available for rent at \$2.25 per week, plus transportation costs.

The National Society explains the talking slide projector:

These projectors are made by several manufacturers. Models range in price from about \$70 to \$130 according to the number and type of lenses, size of screen and of audience.

Arrangements can be made to rent the various models of projectors for periods of one month or more through the office of the National Society for Prevention of Blindness.

Western Union Telegraph Company operates a rental service in many large cities. For details on this service communicate with your local Western Union.

Many commercial firms have these machines and will lend them to non-profit agencies. Firms likely to have the machine include automobile dealers, oil distributors, large manufacturing concerns, distributors of some food products, and some utilities. A number of state health departments also have projectors.

Adult Education as It Is—And as adult education may become, is studied in a series of small volumes issued by American Association for Adult Education, 60 E. 42d St., New York, N. Y. Financed by Carnegie Corporation of New York, these books are distributed free to members of A.A.A.E.

A better understanding of adult education in general may further health education in particular among adults. The first step is to get acquainted with the Association and its *Journal of Adult Education*.

DATES AHEAD

Local and national dates, past and present, special days and events of many kinds offer elements for freshening your own events. Dates may bring a bit of color to a story you need to write or to speak.

Then we want to help other health groups with their special days, or at least we want to avoid planning competitive events.

Birthday of Benjamin Franklin, January 17, 1706.

Birthday of Robert E. Lee, January 19, 1807.

Child Labor Week-End, January 23-29.

First Free School Dental Clinic in America organized January 22, 1907.

Birthday of President Roosevelt, January 30, 1882.

Third National Social Hygiene Day, February 1.

A "Social Hygiene Day Kit" is offered free to agencies sponsoring community or group meetings. Includes program suggestions; press book with news stories, editorials, et cetera; talks and spot announcements for radio; lists of available literature, films, exhibits, and other materials. Slogan: "Guard Against Syphilis!" Address: American Social Hygiene Association, 50 West 50th Street, New York, N. Y.

First modern hospital opened in Philadelphia, February 10, 1752.

Birthday of Daniel Boone, February 11, 1735.

Birthday of Abraham Lincoln, February 12, 1809.

Race Relations Day, February 12. Address: Federal Council of Churches, 297 4th Avenue, New York, N. Y.

St. Valentine's Day, February 14.

1939 Early Diagnosis Campaign is outlined in "Step by Step," an 8 page folder. "An Appeal to Leaders," a 12 page pamphlet, states the case for finding early cases, and the groups most important to reach. Two small, popular folders have effectively simple cover pages. In contrast, two posters have numerous kinds of lettering and other devices in assorted colors. For copies see state and local tuberculosis associations.

"Self-Help In Health" and "Use Your Health Services" were slogans for the recent Health Week in England.

BOOKS AND REPORTS

Sulphanilamide Therapy of Bacterial Infections — *By Ralph R. Mellon, M.D., Paul Gross, M.D., and Frank B. Cooper, M.S. Springfield, Mo.: Thomas, 1938. 398 pp. Price, \$4.00.*

This book clearly expresses in logical sequence the vast amount of material dealing with sulfonamide therapy in experimental and human infections. Especial reference is made to the diseases due to hemolytic streptococci, pneumococci, meningococci and gonococci.

There is an excellent review of the earlier literature of the chemistry and pharmacology of the sulfonamide compounds and their experimental and clinical employment. The author's experiments dealing with the bacteriostatic effect of sulfanilamide *in vitro*, therapeutic results with sulfonamide compounds on streptococcal and pneumococcal infection in laboratory animals, and limited clinical experience with these compounds in pneumonia and streptococcal meningitis are presented. The mechanism of action of sulfonamide compounds and the mobilization of the defense factors of the host, are discussed. General chemotherapeutic consideration and the criteria of therapeutic efficiency as determined by host factors, experimental conditions and the variability of the infective agent, are considered. As addenda, photo-sensitization and the allergic-like action of sulfanilamide, control of sulphemoglobinemia, elixir of sulfanilamide, (Massengill), streptococcal and filtrable virus infections, and sulfonamide compounds, and marrow culture medium for

bacteriostasis tests in chemotherapeutic studies are given.

There is an extensive bibliography of 305 references to American and foreign literature. Dealing with a highly technical subject, it is presented in fascinating style. It should serve as an excellent reference for anyone wishing to get quickly a comprehensive idea of these timely and important therapeutic agents.

JOHN P. WENTWORTH

Essentials of Medicine—*By Charles P. Emerson, M.D., and Nellie Gates Brown, R.N. (13th ed.) Philadelphia: Lippincott, 1938. 845 pp. Price, \$3.00.*

When a book has reached its 13th edition it has proved its worth and there is little to be said of it further than to announce a new edition with the improvements and additions. This 13th edition has been rewritten, and as the authors say, it is essentially new.

The book is intended primarily for nurses, and the rewriting has been done in accordance with the suggestions contained in the *Curriculum Guide for Schools of Nursing*, of the National League of Nursing Education.

The Introduction to Medical Nursing has been considerably enlarged and brought up to date. Public health and sanitation, clinical psychology, and clinical sociology are considered. As the book contains only some 806 pages of text, duodecimo, it is evident that it is condensed, but the authors state that they have been careful to avoid the dangers and evils of "boiling down" a textbook of general medicine.

We believe that the authors have carried out their announced plan with

success. The senior author, Dr. Emerson, died September 26, 1938, after the receipt of the book for review. On page 658 is found an error which is already too common with students, "epidermiology" for epidemiology. The printing and make-up are excellent.

MAZÏCK P. RAVENEL

Parasitology: With Special Reference to Man and Domesticated Animals—By Robert Hegner, Ph.D., Francis M. Root, Ph.D., Donald L. Augustine, Sc.D., and Clay G. Huff, Sc.D. New York: Appleton-Century, 1938. 812 pp. Price, \$7.00.

This book is a second edition of *Animal Parasitology*, by Hegner, Root, and Augustine. It deals with the animal parasites of man and domesticated animals with special emphasis on those which parasitize man. Dr. Huff has revised the section on arthropods originally written by the late Francis M. Root. No radical departures have been made from the previous edition, but revisions have been made throughout bringing the subject matter up to date. A number of new illustrations have also been added. The book leans rather to the zoological side of the subject but emphasizes host-parasite relations and in this way brings in considerable material in connection with the pathology and clinical symptoms produced by parasites. Treatment, prevention, and control are also considered. There is an extensive bibliography but one is disappointed to find that many of the references in the text are not included.

A number of points indicate that the revision was not as complete as it might have been. For instance, under the subject of malaria no mention is made of the parasite which many protozoölogists have designated *Plasmodium ovale*. The penetration of the sporozoite directly into red cells is stated as the apparent fate of this form despite the fact that many recent observations

indicate that some other procedure takes place. An obsolete and cumbersome method of staining thick blood films is given. In connection with kala-azar the more potent pentavalent antimony preparations are not mentioned in treatment. Neither is hexylresorcinol mentioned in the treatment of ascaris. One is also somewhat disappointed to find many typographical errors in a second edition. The book remains, however, as it was in the first edition, one of the best text and reference books in the English language on the animal parasites of man. HENRY E. MELENEY

Public Administration Organizations: A Directory, 1938-1939—1313 East 60th St., Chicago: Public Administration Service. 190 pp. Price, \$1.50.

What each of 558 national organizations do, and which of them do this or that, are two features of this usable and useful reference book. It is the fourth biennial edition of the *Directory* of voluntary organizations working in the field of public administration, or organizations which affect public administration. The range, from Accounting to Weights and Measures Regulation, includes Child Health, Housing, Mental Hygiene, Milk and Food Inspection, Public Health (43 nationals), Physical Education, etc., etc.

Listed, but not described or classified, are 1,342 state groups, 80 regional, and 87 Canadian. EVART G. ROUTZAHN

Mental Health Through Education—By W. Carson Ryan. New York: Commonwealth Fund, 1938. 315 pp. Price, \$1.50.

In his choice of a title for his book, the author proclaims his faith that one of the major goals of all education should be the development of personalities characterized by mental health. The vision of educators should not, then, be narrowly limited to the appli-

cation of the mental hygiene approach only to those pupils who are seriously maladjusted. The educational program should be radically revised so that the principles of mental health may permeate the whole educational system for the purpose of developing and maintaining the mental health of the educational staff as well as of *all* the pupils.

After briefly analyzing many of the aspects of educational programs which remain uninfluenced by the accumulated knowledge of personality development and growth and describing many progressive developments in a variety of fields which may have constructive suggestions for educators, the author lists the following as essential first steps in achieving mental health through education:

1. A re-facing of the educational task by school leaders and the general public, whereby education will endeavor to meet more fundamental human needs than those ordinarily dealt with in the conventional school.

2. Insistence upon a better "emotional climate" for schools with more appropriate school buildings, more wholesome classroom situations, and a more satisfying teacher-child relationship.

3. A radical change in the methods of selection and preparation of teachers and administrators that will make teacher-education more like the training of social workers, with emphasis on cultural resourcefulness, understanding of the sciences underlying behavior, and direct contacts with children.

4. Provision of an enriched and flexible school curriculum, to be determined in each case by the needs and interests of individual human beings and the group, and giving major attention to the arts and other creative activities rather than to traditional subject matter.

5. A new type of school administration, with a mental hygiene viewpoint, that emphasizes optimum growth and development of human beings rather than the mechanics of control, as at present.

6. Extension, as rapidly as possible, of the service of the visiting teacher or a similarly qualified worker to all communities, and the establishment of sufficient child guidance clinics or similar facilities to meet the needs of all children.

7. A closer rapprochement of the family and

the school in mental hygiene activities, and extension of the nursery schools to reach all the families in the community.

8. Active collaboration by the school with community forces working for mental health (with understanding of and consideration for economic and social conditions, religion and religious organizations, racial and cultural influences, play and recreation, motion pictures and radio, and health and biological research).

This book should be of interest to all those who are concerned with education and with the influence of educational programs on the personalities of teachers and pupils. CLARA BASSETT

Maternity Services — *By Dame Janet Campbell. London: Faber & Faber, 1937. 56 pp. Price, \$.50.*

In this clearly written booklet Dr. Campbell has set forth in order the problem which confronts us in maternal mortality, has outlined its various causes and prospects of preventability. She has sketched the maternity services available in England stressing particularly antenatal care and care at the time of confinement. She states that from the standpoint of morbidity better postnatal care should be provided preferably through special women's clinics. From a wealth of experience the author discusses the midwife problem in England. She gives suggestions for training and qualifications, and sets up the standards for the trained nurse-midwife or obstetric nurse. The responsibility of local authorities is clearly set forth. A list of references to the British material is given at the end. Anyone who wishes to get a clear picture of the present status of maternity services in Great Britain should certainly have access to this pamphlet.

RICHARD A. BOLT

Physical and Health Education—
By Helen Norman Smith and Helen Leslie Coops. New York: American Book Co., 1938. 323 pp. Price, \$2.25.

The authors begin wisely in drawing heavily upon various authentic sources in an attempt to establish definitions of terms subsequently used in the book. The subject matter presented also covers basic meanings, curriculum development, physical education and its related activities, health service, health instruction, healthful school living, and a particularly good section on sources of material and reference readings.

In including, with suggested reservations as to their use, the Baldwin-Wood Weight-Height-Age tables on pages 70-71, the authors say incorrectly, "These charts are reprinted by permission of the American Public Health Association (formerly The American Child Health Association)."

This book is an excellent one to help those who have the responsibility for building up school programs, personnel, and administration, as well as for those, be they specialists or non-specialists, actually engaged in the fields of physical and/or health education. The authors cover a wide range of material. The book is so organized as to lend itself to ready reference. W. W. PETER

Medical and Legal Aspects of Tuberculosis as an Occupational Disease and as an Occupational Injury—By Mary Graham Mack. *New York: National Tuberculosis Association, 1938.* 188 pp. Price, \$1.00.

As pointed out by Dr. Kendall Emerson in a preface to this valuable study, the purpose of the volume is not to present an exhaustive summary of all cases bearing upon tuberculosis as an occupational disease or an industrial injury or accident, but to present representative decisions with discussion of the various problems involved so that litigants, lawyers, social workers, courts, and boards of various kinds may be able to refer readily to citations bearing upon questions in point.

Both as a reference work and as a

guide to the solution of a difficult and somewhat moot problem, this book should prove of general value. It might have been improved somewhat by including all court decisions in one section, with more complete legal citations; and all administrative rulings in another, since the courts rather than quasi-judicial bodies always have the final say in legal matters. Sanitarians and physicians concerned with tuberculosis, industrial hygiene and workmen's compensation will find this book well worth while.

JAMES A. TOBEY

Safeguarding Mental Health—By R. C. McCarthy. *Milwaukee: Bruce Publishing Co., 1937.* 297 pp. Price, \$2.50.

Parents, teachers, and others who are concerned with the training of children will find this popularly written book worth while. Dr. McCarthy, an eminent churchman and educator, with a scientific background makes a splendid case for his thesis that complete success in life involves first of all, the observance of one's *moral and religious obligations*. Even when these terms are broadly construed, this means the ability to adapt one's self, contentedly and happily to the various difficulties which life brings.

What is the test of social adjustment? The ability to rise above one's circumstances, in itself the proof of maturity. Now such *emotional* maturity is not achieved automatically and is not the gift of time; therefore, we must strive for it intelligently and even painfully. Children, of course, are badly handicapped in such a struggle through their parent's ignorance of the means to be employed in training them. The book is obviously written to fill this need. In a word, safeguarding mental health is a matter of training the individual to keep his mental poise, something which we cannot start too young, and alas!

most people need guidance in the matter. As products of a high speed civilization, we are a high strung, nervously irritable and neurotic people. We may not return to the simple life, and life itself becomes more hasty, impetuous, and unhealthy. Therefore, since we cannot change these conditions, we *can* change our attitude toward them, which of course will involve different requirements with different people.

N. M. GRIER

Babies Are Human Beings—*By C. Anderson Aldrich, M.D., and Mary M. Aldrich. New York: Macmillan, 1938. 128 pp. Price, \$1.75.*

This is the kind of a book that many of us for some time have been hoping would appear. It is unique both in its manner of approach to a perennial subject and the interweaving of scientific facts with subtle suggestions as to how they may be applied to the growth and development of children.

The charm with which it is written grips the attention from the first page and carries one along as more complex material is introduced. It presents the baby as a dynamic individual in which no artificial lines can be drawn between the physical, mental, and emotional development. The authors insist that "in babyhood the developmental plan requires support by parents at every step," hence a book of this kind to act as a guide to parents and not as a textbook. Parents are encouraged to study the normal growth of their children so as to adopt methods of education which synchronize with stages of development. "The idea that learning is related to growth has always been appreciated by the progressive educators who have had the courage to say that the time to teach any subject to a child is when he shows that he is mature enough to learn it."

Physicians and nurses as well as parents would do well to read this

book. The publishers have exhibited their usual good taste in setting this book up in excellent form with attractive covers, readable type, and well chosen illustrations.

RICHARD A. BOLT

Research Memorandum on Migration Differentials —*By Dorothy Swaine Thomas. Social Science Research Council, Bulletin No. 43. New York, 1938. 423 pp. Price, \$2.00.*

This memorandum is a report of the Committee on Migration Differentials of the Social Science Research Council. The report attempts to meet a need for examination of the existing body of information on the differential characteristics of migrating and non-migrating groups. It is hoped that such information may serve as a foundation for further research on migration differentials.

The Memorandum is organized into eight sections each dealing with one differential. The following subjects are treated: age, sex, family status, physical health, mental health, intelligence, occupation, motivation and assimilation. Only the most significant and methodologically sound studies are fully treated in the body of the study. Others are analyzed briefly in the appendix. Extensive and annotated bibliographies are also included in the appendix.

Of particular interest to students of public health are the sections on physical and mental health differentials. The findings included in the studies analyzed seem to lead to the inference that internal migrations exercise a selective influence from the point of view of health, the migrants appearing on the whole a somewhat healthier group than non-migrants. As to mental health no definite conclusions can be drawn until we get sounder definitions of mental health and comparable methods of measuring it.

The principal value of the study lies

in the critique of method and technics for attacking the problem of migration differentials.

C. T. PIHLBLAD

Health Guides and Guards—*By Francis P. Wall and Louis D. Zeidberg, M.D. (rev. ed.). New York: Prentice-Hall, 1938. 380 pp. Price, \$1.40.*

Except for the fact that a considerable portion of the early part of the text is devoted to a description of the genital system, and to the discussion of venereal diseases, this is much like the usual text for the secondary school level. Nearly one-third of the pages are devoted to community hygiene, discussing the causes of disease, the means by which they are spread, and such factors as disinfection, water supply, milk and food protection, and sewage and refuse disposal.

At the end are some 25 pages of questions of the true-false and of the essay type on the material in the text.

One finishes the text with the feeling that too much attention is given to structures and diseases, and too little to hygiene and measures for improved healthful living.

CHARLES H. KEENE

Research Memorandum on Population Redistribution Within the United States—*By Rupert B. Vance. New York: Social Science Research Council, Bulletin No. 42, 1938. 134 pp. Price, \$1.00.*

Internal migrations and the redistribution of population in the United States are creating a whole series of new problems in the field of public health. The health needs of a community obviously are conditioned by the composition and characteristics of the population. The ability to develop and support a public health program also depends on the proportion of the population in the gainfully employable ages and upon the relation between the size of the population, the natural re-

sources, and the cultural and intellectual level attained. The rapid movements of population within the United States are rapidly changing all these conditions, hence the subject is one which deserves the close attention of all students of the public health.

The *Bulletin* reviewed here is one of a series of memoranda sponsored by the Social Science Research Council on the subject of population redistribution. It attempts to continue the work done by Dr. Carter Goodrich and others in their monograph: *Migration and Economic Opportunity*. According to the author the purpose is to "explore the redistribution of population within the United States as an area of research" by presenting the "(1) accepted interpretations in the field; (2) the materials on which these interpretations are based; (3) the gaps in the data; (4) the next lines of feasible research."

In the introductory chapter the writer explains the concept of "Population Redistribution" and methods of attacking the problem, together with some general concepts relating it to the field in which it falls. He feels that the problem may best be attacked on 5 major fronts: (1) contrasting areas of economic opportunities, (2) differential population increase, (3) differential changes in employment capacity, (4) movement of employment opportunities, and (5) internal migration and labor mobility.

In the 4 main chapters of the monograph the main conclusions to be drawn from some of the better known researches in these fields are stated and the lines along which further research seems profitable are indicated. The principal conclusions to be drawn from a review of the literature are stated in terms of some 20 or more propositions and corollaries and the lines for future research indicated in the framework of a series of queries which are to be answered by suggested research projects.

Most of the "propositions" consist of rather well recognized generalizations familiar to students of this field, as for example: "Agriculture faces a long time trend of diminishing employment capacity because increasing output per worker has met no appreciable domestic increase in per capita consumption of agricultural products and a declining export demand." Whether there is anything to be gained by stating such descriptive generalizations as fundamental "propositions" seems doubtful. The study, however, has distinct value in indicating that much more research needs to be done, and many more facts known, before we shall be in a position to develop adequate policies for control of internal migration and population distribution.

The author has performed a distinct service in indicating the lines along which such research might proceed, although the practicability of some of the projects might be questioned.

C. T. PIHLBLAD

A Textbook of Medical Bacteriology—By *David L. Belding, M.D., and Alice T. Marston, Ph.D., in collaboration with others.* New York: Appleton-Century, 1938. 592 pp. Price, \$5.00.

According to the preface, this book is intended to present a concise yet comprehensive text on bacteriology intermediate between the reference books and those which are too elementary for medical students. It is primarily a teaching text devised for medical students though it is hoped that it will be useful to practising physicians as well. The great mass of references has been omitted, and on controversial subjects only one point of view has been presented.

The relation of bacteria to public health and preventive medicine is emphasized. Immunity is presented as a distinct entity, though specific applica-

tions are considered in connection with each of the various disease producing agents. A relatively greater amount of space than usual has been devoted to the fungi and to the ultramicroscopic viruses.

On the whole, the authors have attained fairly well their objective and have produced a readable textbook. In many respects, however, they have omitted too much. For example, no staining method for Negri bodies has been given. There is a very misleading and dangerous statement to the effect that Semple's method "is extremely efficient both for treatment and prophylaxis, the fatality in treated human cases being below 1 per cent." This certainly is a recommendation of Semple's vaccine for treatment of the disease, whatever the authors may have intended it to be. As a fact, human cases of rabies die practically invariably, never mind what treatment is used, and Semple's method has never been recommended except as a preventive. The statement concerning prophylaxis in dogs by a single injection of phenolized virus annually is deficient. It has not been uniformly successful.

Some other errors are detected. On page 520, we are told that a standard milk ordinance was framed in 1926 by the "United States Public Health Association." There is no such organization and the authors doubtless refer to the Standard Ordinance of the United States Public Health Service.

In the text there are certain arrangements which are not in sequence. For example, the work of Reed in 1898, which proved the transmission of yellow fever by mosquitoes is given ahead of the discovery by Ross concerning avian malaria and his proof that the *Anopheles* mosquito was the carrier of human malaria. Smith and Kilborne were unquestionably the first to show the carrying of a disease by an insect, but the discovery of Ross was a good

deal closer to Reed's work both in time and in character than the fundamental work of Smith and Kilborne.

The index is defective. Yellow fever is not listed, though two pages are given to it. We believe also that a greater number of stains should be given.

The authors seem to have a fondness for terms which are unusual. Diphtheric, which is allowable, is used throughout the book instead of diphtheritic. Proteic seems to be the adjectival form of protein. The virus diseases are described as "viral." We have been unable to find any justification for this adjectival form. Seven pages are given to a glossary, which gives some uncommon definitions. Medical students should be taught the use of a medical dictionary and there seems to be no good reason for the glossary in a book intended for their use, and certainly any physician who can understand the text should know the terms used.

The book is generally well and interestingly written, though the student will need a good deal of supplementary information to be a finished product.

MAZYCK P. RAVENEL

The Hospital Survey for New York. *Report presented to the Survey Committee by its Study Committee.* Vol. III. New York: United Hospital Fund, 1938. 539 pp. Price, \$2.00.

This is Volume III published in connection with a most extensive survey carried on of the agencies which concern themselves with the varied forms of the care of the sick in Metropolitan New York.

Of the total investment in this area of almost three-quarters of a billion in hospitals of various types, nursing agencies, etc., almost \$650,000,000 represents the investment of hospitals alone. This is approximately 20 per cent of the total investment in hospitals in the whole of the United States. Al-

most \$110,000,000 are expended in greater New York annually for the maintenance of these institutions and activities; indeed, a staggering sum, the expenditure of which justifies most intensive study and analysis.

Twelve chapters in this book are devoted to a discussion of the problems confronting these hospitals, facilities for acute, chronic, and convalescent care, out-patient departments, nursing services, costs, the present methods for financing income, etc. A particularly intriguing chapter is devoted to certain prophesies as to needs in this field within the next 22 years. Estimates are based on an increase in population of approximately 7,000,000 by 1960; over \$500,000,000 for hospitals alone in Metropolitan New York.

In addition to this estimated expenditure, it is claimed that over \$50,000,000 more will be needed for reasonable facilities for the care of the chronic ill, and about \$17,000,000 for convalescent care, making for a total estimate as to future needs of over \$600,000,000.

Certainly this anticipated knowledge must make for more intelligent planning, commensurate with existing financial resources, rather than the haphazard methods which have been applied in many communities in connection with hospital development.

As an aid to those who may be planning the erection and maintenance of hospitals, as well as a volume which devotes space to cost analysis, this book should prove of great interest to hospital superintendents, to members of boards of trustees, as well as to generous givers who have made the voluntary hospital structure possible in the past.

CHARLES F. WILINSKY

Internships and Residencies—*A Report by the New York Committee on the Study of Hospital Internships and Residencies.* New York: Commonwealth Fund, 1938. 492 pp. Price, \$2.50.

In 1934, under the leadership of Dr. John Wyckoff, the five medical schools of New York City organized a committee to study the hospital internships and residencies that were available in the environs of New York. Since the internship is now generally recognized as an integral and essential part of medical education, the medical colleges believed that they should determine if the various internships that were immediately available to their graduates offered suitable and pertinent instruction which would give proper preparation for medical practice. It was anticipated that the results of this study would aid in improvement of the quality of training in the intern-

ship and hospital residence programs of the various institutions. This report is a summary of the 3 years' work.

The scope of this study is indicated by the fact that nearly 1,800 internships and residencies approved by the American Medical Association are available in the 67 hospitals that were included in this study.

The report is of value to the medical student who is planning for his internship. It is of special interest to hospital authorities who desire to improve their internships so that the training becomes of real value to their interns. Medical educators will also read this report with interest and satisfaction.

W. G. SMILLIE

BOOKS RECEIVED

- PREPRINT FROM BERGEY'S MANUAL OF DETERMINATIVE BACTERIOLOGY. 5th ed. A Key for the Identification of Organisms of the Class Schizomycetes. By David H. Bergey, Robert S. Breed and E. G. D. Murray. Baltimore: Williams & Wilkins, 1938. 77 pp. Price, \$1.00.
- MEDICINE IN MODERN SOCIETY. By Riesman. Princeton: Princeton University Press, 1938. 226 pp. Price, \$2.50.
- "TELL ME THE TRUTH, DOCTOR." By Irwin I. Lubowe. Philadelphia: Dorrance, 1938. 92 pp. Price, \$1.50.
- WATER SUPPLY AND PURIFICATION. By W. A. Hardenbergh. Scranton: International Textbook Co., 1938. 458 pp. Price, \$4.00.
- YOUR CHEST SHOULD BE FLAT. The Deep Chest Makes Better Soil for Tuberculosis. By S. A. Weisman. Philadelphia: Lippincott, 1938. 145 pp. Price, \$2.00.
- MARIJUANA. By Robert P. Walton. Philadelphia: Lippincott, 1938. 223 pp. Price, \$3.00.
- FOOD FOR BEAUTY. By Helena Rubinstein. New York: Washburn, 1938. 245 pp. Price, \$2.50.
- SILICOSIS AND ASBESTOSIS. By A. J. Lanza. New York: Oxford, 1938. 439 pp. Price, \$4.25.
- MEDICAL INFORMATION FOR SOCIAL WORKERS. By William M. Champion. Baltimore: Wood, 1938. 529 pp. Price, \$4.00.
- RESEARCH IN MENTAL HOSPITALS. By The National Committee for Mental Hygiene, New York, 1938. 151 pp.
- TOXICITY OF INDUSTRIAL ORGANIC SOLVENTS. Report No. 80 of the Industrial Health Research Board. New York: Chemical Pub. Co., 1938. 388 pp. Price, \$3.50.
- FUNDAMENTALS OF DENTISTRY IN MEDICINE AND PUBLIC HEALTH. By John Oppie McCall. New York: Macmillan, 1938. 161 pp. Price, \$2.75.
- ALICE IN VIRUSLAND. By Paul F. Clark. Baltimore: Williams & Wilkins, 1938. 23 pp. Price, \$1.00.
- REPORT ON CARDIAZOL TREATMENT AND ON THE PRESENT APPLICATION OF HYPOGLYCAEMIC SHOCK TREATMENT IN SCHIZOPHRENIA. By W. Rees Thomas and Isabel G. H. Wilson. New York: British Library of Information, 1938. 70 pp. Price, \$3.00.
- INSTRUCTIONAL PRACTICES IN ELEMENTARY SCHOOLS. *Bulletin 306*. Department of Public Instruction: Lansing, Mich. 178 pp. 1938.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Defects We Find and Forget—
A good, honest, soul-searching consideration of school medical inspection services, which we have assumed with such complacency, is producing results in better school child health. Under the anonymous author's scrutiny a few pet assumptions about adult health examinations wither too.

ANON. School Medical Inspection or the Periodic Health Examination. Health Officer. 3, 5-6:109 (Sept.-Oct.), 1938.

Are Mental Diseases Increasing?
—Alarm-viewers will be disappointed to learn from this excellent article that data from Massachusetts, New York, and Illinois (three states that have had for some time the most nearly satisfactory institutional facilities) do not support their frequently voiced assumption that mental disorders are increasing rapidly. The apparent increase may be due to increasing life expectancy, larger proportion of old people in the population, better facilities, and more general appreciation of the value of treatment. This much is clear, the burden of caring for mental illness will increase, even if the incidence does not.

DORN, H. F. The Incidence and Future Expectancy of Mental Disease. Pub. Health Rep. 53, 45:1991 (Nov. 11), 1938.

Another Source of Encephalitis
—Equine encephalitis is transmissible to humans. In September, 1937, 6 cases were reported in Minnesota. In 1938, 8 fatal cases among youngsters in Massachusetts were studied.

EKLUND, C. M., and BLUMSTEIN, A. The Relation of Human Encephalitis to Encephalitis in Horses (and) WESSELHOEFT, C., *et al.* Human Encephalitis. J.A.M.A. 111, 19: 1734 (Nov. 5), 1938.

Pneumonia Prophylaxis—During the winter of 1936-1937, some of the men in CCC camps in New England and California were treated with Felton's pneumococcus antigen. In New England the pneumonia incidence rate was reduced nearly half and in California to one-eighth. Although the demonstration leaves some questions about length of immunity, etc., unanswered, it does suggest that a pneumonia vaccine will prove a useful prophylactic.

EKWURZEL, G. M., *et al.* Studies on Immunizing Substances in Pneumococci. Pub. Health Rep. 53, 42:1855 (Oct. 21), 1938.

Epidemiology and the Pneumococcus—Here is evidence that the type I pneumococcus is highly infectious, manifesting itself as pneumonia, suppurative ears, or just colds. Incidence of the carrier condition is high among contacts, healthy carriers being confined to adults. There is much more to be learned from this study.

GILMAN, B. B., and ANDERSON, G. W. A Community Outbreak of Type I Pneumococcus Infection. Am. J. Hyg. 28, 3:345 (Nov.), 1938.

Re Medical Economics —Sanitarians will have an academic interest, at least, in this apparently objective account of the attempt to provide prepaid medical services among certain government employees in Washington, D. C.

HARD, W. Medicine and Monopoly. Survey Graphic. 27, 12:581 (Dec.), 1938.

Studying Causes of Maternal Deaths—Maternal death rates in Massachusetts have declined from a recent peak of 6.8 per thousand in 1929

to 4.1 in 1937. The study of deaths during and since 1937 reveals, as usual, that sepsis is most to be feared. What can be done to improve the situation is profitably discussed.

HEFFERNAN, R. J. The Maternal Mortality Study in Massachusetts for 1937. *New Eng. J. Med.* 219, 22:864 (Dec. 1), 1938.

Through Neighboring Doorways

—By the use of the Municipal Doctor system, joint medical and health services have been made available to western Canadian communities for nearly two decades. Other forms of providing public medical services have been under trial for some time. It is possible that this Canadian experience will be of some value to us, if and when we begin experiments in this field.

JACKSON, F. W. Recent Extension and Future of Medical and Public Health Services (Canada). *Pub. Health.* 3, 5-6, 132 (Sept.-Oct.), 1938.

Which Diphtheria Prophylactic?

Guinea pigs show superiority of alum-precipitated toxoid over unmodified toxoid. If more than one dose of antigen is to be used, the first should be alum-precipitated; the second either the same or plain.

JONES, F. G. Experiments in the Guinea Pig Comparing the Immunizing Value of Unmodified Diphtheria Toxoid and Alum-Precipitated Toxoid. *Am. J. Hyg.* 28, 3:359 (Nov.), 1938.

For All To Ponder Over—Among Massachusetts patients with chronic disease, one in four had not sought medical care. Most failed to get this help because of lack of understanding of the need rather than inability to pay. Cancer patients continue to delay in seeking medical care, and patients with other chronic conditions are in need of persuasive education.

LOMBARD, H. L. Education A Major Need in Adequate Medical Care. *J.A.M.A.* 111, 19:1747 (Nov. 5), 1938.

And May Their Tribe Increase—These tables showing the marked improvement in the employment of public health nurses make good reading indeed. Statistics about who employs the nineteen-odd thousand nurses are also of interest to all of us.

REID, M. 1938 Census of Public Health Nurses. *Pub. Health Nurs.* 30, 11:632 (Nov.), 1938.

Nutrition Versus Caries—Milk with vitamin D added to an otherwise unbalanced institutional diet did not prevent the extension of dental caries, though the condition of teeth of children fed the milk supplement was slightly better than the controls. The moral is that other nutritional factors are involved in the prevention of caries.

ROBERTS, L. J., *et al.* Effect of a Milk Supplement on the Physical Status of Institutional Children. *Am. J. Dis. Child.* 56, 4:805 (Oct.), 1938.

Nutrition and Tomorrow's Hygiene—Lesions of the nervous system common in beriberi, pellagra, and in polyneuritis associated with many other conditions are traceable to vitamin B deficiency. In the future many other neurologic and perhaps psychiatric complexes will be found due to the same cause. This paper is another pointer to the part nutrition will play in the hygiene of tomorrow.

SHATTUCK, G. C. Nutritional Deficiency and the Nervous System. *J.A.M.A.* 111, 19:1728 (Nov. 5), 1938.

Guinea Pigs Confirm Grandma's Unshaken Belief—Experiments are reported which suggest that morbid body changes following chilling are due to constriction of peripheral blood vessels, lowered leucocyte response, and impairment of protective capabilities of tissue cells. These changes predispose to infections of upper respiratory tract.

TAYLOR, H. M., and DYRENFORTH, L. Y. Chilling of the Body Surfaces. *J.A.M.A.* 111, 19:1744 (Nov. 5), 1938.

ASSOCIATION NEWS

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

- Theodore J. Bauer, M.D., 112 Federal Bldg., San Francisco, Calif., Passed Assistant Surgeon, U. S. Public Health Service
- Fred P. Long, M.D., Box 443, North Platte, Nebr., Director, Demonstration District Health Unit
- Thomas Morcom, M.D., Nome, Alaska, Assistant Commissioner of Health, Territory of Alaska
- William P. Rice, M.D., C.P.H., 1818 Delaney St., Orlando, Fla., Director, Orange County Health Unit
- Dr. Gustavo A. Rovirosa, Calle de Zamora 174, Mexico, D. F., Mex., Jefe de la Oficina Central de Higiene Rural, Dept. of Health
- Pearl A. Toivonen, M.D., Ontonagon, Mich., County Health Officer
- Donald H. Williams, M.D., 2700 Laurel St., Vancouver, B. C., Canada, Director, Venereal Disease Control, Provincial Board of Health

Laboratory Section

- Kathleen H. Clark, 2830 Bancroft Way, Berkeley, Calif., Student
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- Margaret R. Harrison, U. S. Marine Hospital, Staten Island, N. Y., Associate Chemist, U. S. Public Health Service
- Thomas F. Judefind, M.D., College of Medical Evangelists, Loma Linda, Calif., Instructor in Bacteriology
- Richard H. Knapper, 711 Forbes St., Pittsburgh, Pa., Research in Apparatus for Public Health and Hospital Laboratories, Fisher Scientific Co.
- Mercedes Luxen, 283 Alvarado St., Chula Vista, Calif., Student

- John F. Mahoney, M.D., U. S. Marine Hospital, Stapleton, Staten Island, N. Y., Director, Venereal Disease Research Laboratory, U. S. Public Health Service
- Fred Nussberger, 44-14 Rd., Broad Channel, N. Y., Chemical Laboratory Assistant, Dept. of Health
- Anna I. van Saun, Board of Health, Paterson, N. J., Director of Laboratory, Board of Health
- Herbert G. Weitzman, 1934 Haste St., Berkeley, Calif., Student
- Jack C. Wyatt, City Hall, Amarillo, Tex., Chemist in charge of sanitation, Amarillo-Potter County Health Unit

Vital Statistics Section

- Frank M. Beresford, M.D., 4601 Market St., Philadelphia, Pa., Medical Director, Provident Mutual Life Insurance Co.
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- Daniel E. Lynch, Jr., 810 Ocean Ave., Brooklyn, N. Y., Chemist, Bureau of Sewage Disposal, City Dept. of Public Works
- Willard S. Sitler, Allegan County Health Dept., Allegan, Mich., Student Sanitarian

Industrial Hygiene Section

- Ralph W. Ryan, P. O. Box 101, Charleston, W. Va., Chemist and X-ray Technician, State Workmen's Compensation Commission

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Emanuel Sigoloff, M.D., 642 Missouri Bldg., St. Louis, Mo., Charge of Pneumonia Control Program, St. Louis Health Division

Unaffiliated

Leonard J. Duckworth, 4544 Tulip Ave., Oakland, Calif., Student

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Hugo V. Hullerman, M.D., 332 E. Jefferson St., Ann Arbor, Mich., Trainee

Saul Karch, 2711 Pasadena, Detroit, Mich., Student

Frederick A. Musacchio, M.D., 2101 Devonshire, Ann Arbor, Mich., Student

Walter J. Pelton, D.D.S., 705 Oakland Ave., Ann Arbor, Mich., Passed Assistant Dental Surgeon, U. S. Public Health Service—Student at present

DECEASED MEMBERS

R. B. Durfee, M.D., Bisbee, Ariz., Elected Member 1919, Fellow 1934

I. Malinde Havey, R.N., Washington, D. C., Elected Member 1922, Fellow 1932

Frank W. Laidlaw, M.D., Middletown, N. Y., Elected Member 1927, Fellow 1930

John M. J. Raunick, M.D., Harrisburg, Pa., Elected Member 1915, Fellow 1922

Henry C. Becker, M.D.V., Chicago, Ill., Elected Member 1927

Wesley M. Graff, New York, N. Y., Elected Member 1936

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge.

Replies to these advertisements, indicating clearly the key number on the envelope, should be addressed to the American Public Health Association, 50 W. 50 Street, New York, N. Y.

POSITIONS WANTED

HEALTH OFFICERS

Well qualified physician, with C.P.H. from Johns Hopkins; experienced as school physician and in college teaching, will consider city or county administrative position or teaching and student health service. A383

Physician, M.D., Class A medical school; M.S.P.H., University of Michigan, 1937; now serving as district state health officer, seeks full-time administrative position in city or county. A367

Physician, M.D., Class A medical school; M.P.H., Harvard School of Public Health; extensive experience in pediatrics and school medical services; also background of county health administration and teaching in medical school, will consider expanded opportunity in teaching or research. A302

Physician, M.D., C.P.H., 2 years' experience as district health officer; prefers to do venereal disease control work or epidemiology. A345

Physician, with M.P.H. from Harvard, experienced as epidemiologist and in county health administration, also in communicable diseases at state level, seeks responsible position. A392

Physician, M.D., University of Cincinnati; with postgraduate training in venereal disease control, Johns Hopkins; now employed, is available as venereal disease control officer. A363

HEALTH EDUCATION

Young woman, M.S.P.H., University of Michigan, experienced in laboratory research

and health education, is available for research or investigative work. H303

Dentist, with wide training and experience in educational lines, wishes responsible position in health education. H393

LABORATORY

Capable research worker; Ph.D., trained at University of Southern California and Pasteur Institute, seeks position directing laboratory, in research work or field investigation. Has taught bacteriology, directed state hygiene laboratory and hospital laboratories. L315

Woman bacteriologist; B.A., Chemistry, 1933; 5 years' experience in experimental and practical therapeutics including animal work; desires position in public health field. L394

Laboratory technician, who has had experience in a variety of laboratory and inspection positions, seeks an appointment in the Midwest or Southwest. Good references. L395

MISCELLANEOUS

Industrial hygiene engineer, S.M. in Sanitary Engineering (Industrial Hygiene) from Harvard Graduate School of Engineering; field experience; desires position with public health department or private health agency. M391

Experienced teacher in bacteriology and public health; Ph.D., Cornell; now professor in Grade A medical school, will consider teaching, executive or administrative position. M327

NEWS FROM THE FIELD

SOUTHERN BRANCH OFFICERS

AT its Seventh Annual Meeting, held in Oklahoma City, Okla., November 15-16, 1938, the Southern Branch of the American Public Health Association elected the following officers to serve for the forthcoming year:

President—J. N. Baker, M.D., Montgomery, Ala.

First Vice-President—W. B. Grayson, M.D., Little Rock, Ark.

Second Vice-President—V. M. Ehlers, C.E., Austin, Tex.

Third Vice-President—Donna Pearce, R.N., Washington, D. C.

Secretary-Treasurer—P. E. Blackerby, M.D., Louisville, Ky.

25TH ANNIVERSARY OF WALLACE & TIERNAN

WALLACE & Tiernan Co., Inc., Newark, N. J., celebrated the 25th Anniversary of its incorporation—November 13, 1913—with a series of Silver Jubilee celebrations.

November 11 was selected as the nearest working day to the actual Anniversary date, Sunday, November 13. Beginning the formal ceremonies at 11 A.M., two minutes of silence commemorating Armistice Day, was followed by an interesting program. Mr. M. F. Tiernan, President of the Company, reviewed various highlights in the growth of the organization from the date of its incorporation. He traced the growth of the organization through its 25 years of existence to today with its thousand or more employees—with its extensive headquarters office and factory buildings occupying over 6 acres at Belleville, N. J., and with additional factories in Canada and England and 42 sales and service headquarters, together with representatives in over 57 foreign countries.

William J. Orchard, General Sales Manager, said, "... every product or process marketed by the company is a direct benefit to the welfare of mankind touching on the preservation of health or life itself."

Mr. Tiernan touched upon the activities of the organization in the manufacture of chlorine control apparatus, the development of processes for maturing and bleaching flour, treatment of various industrial process waters, the chlorination of condenser water, production of lighted aids to navigation for the U. S. Lighthouse Service, development of nautical radio beacon control apparatus, development of a process for the prevention of decay in fruit and vegetables, and acquisition by Novadel-Agene Corporation (an affiliate) of the Kooler-KeG Beer Dispensing System. Mr. Tiernan introduced Judge Charles E. McMahon of New York City, who drew the original incorporation papers of Wallace & Tiernan Company, and who spoke on "W & T 25 Years Ago—and Since."

NEW JERSEY HEALTH AND SANITARY ASSOCIATION

THE 64th Annual Meeting of the New Jersey Health and Sanitary Association, was held at Asbury Park, N. J., November 18-19, 1938, in cooperation with the Conference of Health Officers—New York Metropolitan Area, New Jersey Health Officers Association, American Social Hygiene Association, and the New Jersey Anti-Syphilis Committee. Approximately 900 delegates attended.

The new officers elected were:

President, Joseph R. Morrow, M.D., Ridgewood

1st Vice-President, L. D. Bristol, M.D., Montclair

2nd Vice-President, L. VanD. Chandler, Hackensack

3rd Vice-President, Joseph E. Raycroft, M.D., Princeton

Secretary, Edward Guion, M.D., Northfield

Treasurer, Budd H. Obert, Asbury Park

FLORIDA PUBLIC HEALTH ASSOCIATION

THE Tenth Annual Meeting of the Florida Public Health Association was held at Hollywood, Fla., November 28-30, 1938. The attendance was the largest in the history of the association and the papers were of high quality and interest.

Special attention was centered on three diseases which are of particular concern to this state, namely, yellow fever, malaria, and hookworm infestation. One paper of great interest had to do with sanitary precautions on International Airways. This was especially timely since Miami handles more international airplane passengers than any airport in the United States.

The following officers were elected to serve until the next annual meeting to be held in Jacksonville late in 1939, the exact time having not yet been determined.

President—S. D. Macready, West Palm Beach

First Vice-President—A. P. Black, Ph.D., Gainesville

Second Vice-President—Elizabeth Reed, Marianna

Secretary-Treasurer—Edward M. L'Engle, M.D., Jacksonville

CONFERENCE OF MUNICIPAL PUBLIC HEALTH ENGINEERS

A NEW organization known as "The Conference of Municipal Public Health Engineers" was formed on Wednesday, October 26, during the 1938 Sessions of the American Public Health Association, with the following officers:

Chairman—Joel I. Connolly, Chicago, Ill.

Vice-Chairman—Aimé Cousineau, Montreal.

Secretary-Treasurer—Alfred H. Fletcher, Memphis, Tenn.

Executive Committee:

James L. Barron, Nassau County, N. Y.

Arthur E. Gorman, Chicago, Ill.

Henry C. Lanc, Minneapolis, Minn.

F. Gardner Legg, Detroit, Mich.

Sol Pincus, New York, N. Y.

The first meeting will be held on Monday, one day immediately preceding the 1939 Convention of the American Public Health Association. This new organization will provide a medium for an exchange of ideas relating to the problems of the municipal public health engineer, to the end that the various activities, studies, measures, methods and administrative procedures for carrying on effective engineering health programs and that coöperation to the mutual benefit of the Conference of State Sanitary Engineers, and the Engineering Section of the American Public Health Association, may be encouraged.

Sanitary and public health engineers in health, water, industrial, and similar related departments of municipalities and urban areas are eligible for membership.

DR. VAUGHAN 25 YEARS DETROIT HEALTH COMMISSIONER

ON January 1, Henry F. Vaughan, D.P.H., will have completed 25 years with the Detroit, Mich., Department of Health.

He will be honored by a dinner given by the staff, to which many people prominent in public health fields will be invited.

PERSONALS

Central States

PHILIP E. M. BOURLAND, M.D., M.S.P.H.,† of Lansing, Mich., recently with the Michigan State Board of Health, has been appointed Director of the Dickinson County Health Unit, succeeding CLIFTON E.

† Member A.P.H.A.

MERRITT, M.D.,† of Bay City, who accepted a similar position in Bay County.

CLIFTON C. CORKILL, M.D.,† of Ontonagon, Mich., Director of the Ontonagon-Baraga Counties Health Unit, has been appointed in charge of the Menominee County Health Department. He succeeds LAWRENCE A. BERG, M.D.,† of Detroit, who is on a year's leave of absence to take a graduate course at the University of Michigan Medical School, Ann Arbor, Mich.

CLAUDE MILTON EBERHART, M.D.,† of Highland, Ill., has been appointed Director of the new health unit including Bond, Clinton, Madison, and St. Clair Counties.

DR. MAURICE GORE, of Aurora, Ill., has been appointed Medical Officer in Charge of the new Health District embracing the Counties of DeKalb, Grundy, Kane, Kendall, and LaSalle.

DR. REUBEN J. HARRINGTON, for 14 years Health Officer of Muskegon, Mich., has been appointed in charge of the unit in Muskegon County, succeeding RICHARD SEARS, M.D.,† of the Michigan State Department of Health.

DR. WILLIAM D. HART has been appointed Director of District Health Unit No. 4, Rising Sun, Ind., succeeding GEORGE M. BROTHER, M.D.,† who is taking a year's study at Johns Hopkins University School of Hygiene and Public Health, Baltimore, Md.

RUSSELL E. PLEUNE, M.D.,† of Lansing, Mich., who was scheduled to take over the post in Dickinson County, is now Director of the Houghton-Keweenaw Health Unit, succeeding FORREST J. AUSTIN, M.D.,† of Houghton.

GUY R. POST, M.D.,† has resigned as Director of the Tri-County Health Unit, serving Newaygo, Lake, and

Oceana Counties, Mich., effective September 15.

ALBERT J. RANDALL, M.D.,† Assistant Director of Health in Kenosha, Wis., has been appointed Director, to succeed GUSTAVE WINDESHEIM,* who retired October 15.

ISAAC D. RAWLINGS, M.D.,* for many years Chief of the Bureau of Communicable Diseases of the Chicago, Ill., Board of Health, has retired.

DR. JOHN F. SHRONTs has been appointed District Health Officer of the new district health department established in Woodstock, Ill., to serve the Counties of Boone, Lake, McHenry, and Winnebago.

MRS. LUCILLE SMITH, Director of Medical Service for the Chicago Relief Administration, resigned October 6 to accept a position with the Social Security Board in Washington, D. C.

DR. LEONARD S. STEADMAN, of Junction City, Kans., has been appointed Health Officer of Geary County, to succeed DR. ROBERT J. LANNING, who recently retired to enter private practice.

DR. WALTER P. STOLTENBERG, of Kinsley, Kans., has been appointed Health Officer of Edwards County.

DR. JOHN S. WOOLERY, of Bedford, Ind., has been appointed Health Officer of Lawrence County, filling the unexpired term of the late DR. WESLEY H. MCKNIGHT.

Eastern States

JOHN H. R. BARRY, M.D.,† of Long Island City, N. Y., for 30 years Assistant Sanitary Superintendent for the Borough of Queens, has retired from the city service.

DR. DAVID BAST, of New York, N. Y., has been named Assistant Director for Oral Hygiene, Division of Maternity, Infancy and Child Hygiene,

* Fellow A.P.H.A.
† Member A.P.H.A.

New York State Department of Health.

DR. EDWARD J. BROPHY is Health Officer of Norwich, Conn., filling the unexpired term of the late DR. HARRISON GRAY.

DR. BYRON H. FARRALL, of Boscawen, N. H., Director of the Division of Maternal and Child Health and Crippled Children Services of the New Hampshire State Board of Health, has resigned. He is to be succeeded by DR. MARY ATCHISON, formerly of Dubuque, Ia.

DR. ARCHIBALD M. GAULOCHER, of Wingdale, N. Y., is Health Officer of Kent, Conn.

DR. MALCOLM GOODRIDGE, Professor of Clinical Medicine at the Cornell University Medical School, New York, N. Y., will succeed DR. JAMES ALEXANDER MILLER as President of the New York Academy of Medicine.

ALMA McCLINTOCK, R.N.,† recently became Supervisor of the State Health Nurses in Allegheny County, City of Pittsburgh, Pa.

DR. DONALD J. MCCRANN, of West Hartford, Conn., has succeeded DR. MAURICE B. THOMPSON as Health Officer of Bloomfield.

DR. ROBERT E. PERDUE was appointed the first full-time Health Officer of Norwalk, Conn., effective Sept. 1. Norwalk is now the 9th city in Connecticut to be on a full-time basis.

FRANK D. URSONE, M.D.,† of Norfolk, Conn., is Health Officer of Colebrook.

DR. CHARLES A. WEAVER, of Concord and Manchester, N. H., has retired after more than 20 years of service with the New Hampshire State Board of Health as Epidemiologist and Director of Venereal Disease Control. Dr. Weaver is 83 years old and graduated from the University School of Medicine in 1881. DR. JOHN S. WHEELER, of Wolfeboro, N. H., will take Dr. Weaver's place temporarily.

Southern States

DR. PAUL W. BOWDEN has been appointed Assistant Health Officer of the Arlington County, Va., Department of Health and Welfare.

HAROLD W. BROWN, M.D., Sc.D., DR.P.H.,† Chapel Hill, N. C., has been appointed Professor of Preventive Medicine and Public Health at the School of Medicine, Duke University, Durham, N. C.

DR. LYMAN T. COX, of El Paso, Tex., has been appointed Health Officer of the city and county of El Paso, succeeding JOHN W. TAPPAN, M.D.†

DR. DURWOOD L. DODD has been appointed Health Officer of Austin, Tex., succeeding DR. FRANCIS BANNER GREGG.

JOHN W. DUGGER, M.D.,† of Jackson, Miss., of the Mississippi State Department of Health, has been appointed in charge of the Marshall County Health Department, succeeding DR. VERNON B. HARRISON, of Holly Springs, who has been granted a year's leave of absence to serve as Assistant Professor of Bacteriology and Preventive Medicine at the University of Mississippi School of Medicine.

HERMAN F. EASOM, M.D.,† of Raleigh, N. C., has been appointed Chairman of the newly formed Committee on Industrial Health of the Medical Society of the State of North Carolina.

DR. ARTHUR GLECKLER, of Sherman, Tex., was recently appointed Health Officer of Grayson County, succeeding DR. BUFORD A. RUSSELL.

DR. EDWARD R. GRAY has been appointed Assistant Chief Statistician in the Division of Financial Statistics of States and Cities, of the Bureau of the Census, Department of Commerce, Washington, D. C.

* Fellow A.P.H.A.

† Member A.P.H.A.

CHARLES C. HEDGES, M.D., Health Officer of the Isle of Wight-Nansemond-Suffolk County Health Department, Va., has been appointed first Medical Assistant to K. E. MILLER, M.D.,* Director of the Medical Division of the Federal Trade Commission, Washington, D. C.

DR. ULYS JACKSON, of Harrison, Ark., has been appointed Medical Director of District No. 14 of the Arkansas State Department of Health, with headquarters in Marshall.

DONALD B. McMULLEN, D.Sc., has been appointed Assistant Professor of Bacteriology at Johns Hopkins University, Baltimore, Md.

LEWIS B. SIMS has been appointed Technical Assistant to the Chief Statistician in the Division of Financial Statistics of States and Cities, of the Bureau of the Census, Department of Commerce, Washington, D. C.

DR. EARNEST L. THOMPSON, of Hot Springs National Park, Ark., has been appointed in charge of the Garland County Health Department, succeeding the late DR. JAMES F. MERRIT.

Western States

DR. ALEXANDER B. BIGLER has been appointed City Health Officer of Chowchilla, Calif., succeeding DR. ALTON C. ATWOOD.

DR. CORNWALL C. EVERMAN is Health Officer of Larkspur, Calif., formerly served by DR. LOUIS L. ROBINSON.

DR. WALTER W. FENTON, Health Officer of San Bernardino County, Calif., will be in charge also of the public health affairs of the city of Needles, recently transferred to the county administration.

RALPH GREGG, M.D.,† of the U. S. Public Health Service, recently stationed in Tacoma, Wash., has been assigned to be Health Officer of Tacoma, succeeding the late SAMUEL M. CRESWELL, M.D.*

DR. FREDERICK W. KNIGHT has been appointed Health Officer of Corcoran, Calif., to succeed the late DR. JAMES H. VANVORHIS.

DR. MORRIS KRUTCHKOFF has been appointed Health Officer of Fernald, Calif., succeeding DR. JOSEPH M. BROWN.

DR. ELLERT E. LUNDEGAARD, of Weimar, Calif., has been appointed Health Officer of Colfax, to succeed DR. RAY C. ATKINSON.

DR. THOMAS L. MEADOR, of Portland, Ore., has been appointed in charge of the Division of Communicable Disease in the city Department of Health.

DR. HAROLD J. SHANKS is now Health Officer of Pleasanton, Calif., succeeding the late DR. WILLIAM D'ARCY CHACE.

DR. DAVID G. SMITH is Health Officer of Corte Madera, Calif., formerly served by DR. LOUIS L. ROBINSON.

DEATHS

LEROY W. HUBBARD, M.D., of Mount Vernon, N. Y., died August 31, 1938. He was connected with the New York City Department of Health from 1897 to 1914, when he joined the State Department of Health. Since 1927 he was connected with the Warm Springs Foundation, Warm Springs, Ga.

L. W. HUTCHCROFT,† Director of the Bureau of Vital Statistics, Wisconsin State Board of Health, died September 28, 1938.

* Fellow A.P.H.A.

† Member A.P.H.A.

CONFERENCES AND DATES

- American Association for Social Security. New York, N. Y. April 7-8.
- American Association of Schools of Social Work, and American Association of Social Workers—Annual Meeting. Cleveland, Ohio, January 26-28.
- American College of Physicians—23rd Annual Session. Municipal Auditorium, New Orleans, La. March 27-31.
- American Orthopsychiatric Association—16th Annual Meeting, on Behavior and Its Disorders. Commodore Hotel, New York, N. Y. February 23-25.
- Annual Congress on Industrial Health (First). Sponsored by American Medical Association. Palmer House, Chicago, Ill. January 9-10.
- American Medical Association, 90th Annual Meeting. St. Louis, Mo. May 15-19.
- American Public Welfare Association. Buffalo, N. Y. June 20-22.
- American Society of Civil Engineers—Annual Meeting. New York, January 18-20. Spring Meeting: Chattanooga, Tenn., April 19-22. Summer Meeting: San Francisco, Calif., July 26-29. Fall Meeting: New York, N. Y., September 4-9.
- American Water Works Association—59th Annual Meeting. Atlantic City, N. J. June 11-15.
- Building Officials Conference of America. Detroit, Mich. May 1-5.
- Catholic University School of Nursing Education—National Symposium on: Philosophy, Religion, Ethics, and the Social Sciences in the Curriculum for Nurses. Catholic University, Washington, D. C. January 5-7.
- Civil Service Assembly—Eastern Regional Conference. Asbury Park, N. J. June 14-17.
- International Association of Public Employment Services. New Orleans, La. April 11-13.
- Massachusetts Public Health Association. Boston, Mass. January 26.
- Michigan Public Health Association. Lansing, Mich. November 8-10.
- National Conference of Social Work. Buffalo, N. Y. June 18-24.
- National County Officers' Association. Ogden, Utah. July 17-22.
- National Education Association, and affiliated organizations. San Francisco, Calif. July 2-6.
- National Public Housing Conference. Washington, D. C. January 20-21.
- Northern California Public Health Association. January, 1939.
- Smoke Prevention Association. Milwaukee, Wis. June 13-16.
- Social Hygiene Day, Third National. February 1.
- Texas Public Health Association. Galveston, Tex. October 9-11.

FOREIGN

- Fourth International Congress of Comparative Pathology. Three Sections: Human Medicine, Veterinary Medicine, and Phytopathology. Rome. May 15-20.
- International Federation for Housing and Town Planning. Stockholm, Sweden. July 8-15.
- World Federation of Education Associations, Eighth Biennial Congress. Rio de Janeiro, Brazil. August 6-11. (SS. Rotterdam Summer Cruise to South America: from New York, July 5; from New Orleans, July 10; returning to New York August 27.)
- International Hospital Congress. Toronto, Canada. September, 1939.
- American Hospital Association. Toronto, Ont., Canada. September, 1939.
- American College of Hospital Administrators. Toronto, Ont., Canada. September 24-25.

DENTAL SURGERY

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Duration of Immunity Conferred by Typhoid Vaccine*

Results of Re-vaccination by Intracutaneous
Injection of Typhoid Vaccine

THE LABORATORY STAFF, ARMY MEDICAL SCHOOL

Under Supervision of

J. F. SILER, M.D., AND

G. C. DUNHAM, M.D., DR.P.H., F.A.P.H.A.

*Colonel, Medical Corps, U. S. Army, Director, Army Medical
School; and Lieut. Colonel, Medical Corps, U. S. Army,
Director of Laboratories, Army Medical School,
Washington, D. C.*

TWO progress reports have been published on the studies being made of typhoid vaccine in the laboratories of the Army Medical School.^{1, 2}

During the past two years we have had the opportunity to undertake experimental studies with a view to estimating the duration of the protection afforded by the vaccine. Also, a study has been made of the value of re-vaccination with a single small dose of vaccine intracutaneously injected. This paper is a progress report of these two phases of our studies of typhoid vaccine.

DURATION OF IMMUNITY

The presence of protective antibodies in the blood stream after vaccination with typhoid vaccine is one indication of immunity, and the persistence of such antibodies over a period of time may be utilized to estimate the duration of the immunity conferred by the vaccine. In conducting these studies, we have used the mouse protection test to measure the antibody content of the blood serum. The mouse protection test measures the passive immunity conferred on mice by the inoculation of blood serum of an immunized individual. This test, as we have used it in our work, has been described in a previous communication.²

Preliminary to the experimental

* Presented by Lieut. Colonel G. C. Dunham, M.C., before the Laboratory Section of the American Public Health Association at the Sixty-seventh meeting in Kansas City, Mo., October 26, 1938.

studies regarding duration of immunity in vaccinated individuals, a study was made of a group of individuals who had never been vaccinated and who presented no history of having had typhoid fever. In all tests made before vaccination a constant dose of 10,000 organisms was used against 0.1 c.c. of individual's serum, on the assumption that if 0.1 c.c. of the blood serum of an individual afforded mice no protection against 10,000 live virulent typhoid organisms, the individual, arbitrarily, could be considered non-immune. This method was used as a screening test to eliminate those who were highly immune, and to conserve mice; also, because of the difficulty of determining the end point where the protective antibody content of the serum is very low.

All such tests were controlled by injection into groups of mice of 10, 100, and 1,000 organisms without serum, to determine the minimum lethal dose of the culture being used. In this series of observations, it was found that the minimum lethal dose for the control mice was either 100 or 1,000 organisms. Consequently, where, for example, an individual's serum did not protect mice against the dose of 10,000 organisms, the number of m.l.d. against which that serum, theoretically, would afford no protection might be as low as 10 or 100, depending on the

virulence of the culture used. In Table I, the results of the tests are expressed as the number of m.l.d. of the test organism (Strain No. 63 *infra*) against which the serum protected or failed to protect mice.

A constant dose of 10,000 organisms was used in testing sera before vaccination. In some of the cases included in this study, 10,000 organisms of the culture used represented 100 m.l.d. for the control mice, while in other cases 10,000 organisms represented only 10 m.l.d. The former are placed in the first group and the latter in the second group in Table I. It is possible that the blood sera of many of the 176 persons in the first group which failed to protect mice against 100 m.l.d., would also have failed to protect against 10 m.l.d. had 1,000 instead of 10,000 test organisms been used.

Apparently, in many instances, the adult individual possesses some immunity to typhoid fever, even though he has not had typhoid fever in a diagnosable form and has never been immunized by vaccination. Our studies indicate that the protective antibody content of the blood sera of a large proportion of these individuals is relatively low, as compared with that of vaccinated persons. As shown in Table I, the blood sera of 79 per cent of the first group of 222 persons failed to protect mice against 100 m.l.d. of the test

TABLE I

Protective Antibody Content of Blood Sera of Individuals Not Vaccinated. Results Are Expressed as the Number of Minimum Lethal Doses of the Test Organism Against Which the Serum of the Individual Tested Protected, or Failed to Protect, Mice

	First Group 100 * m.l.d.		Second Group 10 * m.l.d.		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Protected	46	21	51	24	97	22
Failed to protect	176	79	163	76	339	78
Total	222	100	214	100	436	100

* The test dose consisted of 10,000 organisms and represented either 10 or 100 minimum lethal doses, depending upon the virulence of culture used.

organism, and 76 per cent of the second group of 214 failed to protect against 10 m.l.d.

In this study, the blood sera of 21 per cent of the first group and 24 per cent of the second group protected mice against more than 100 m.l.d. and 10 m.l.d., respectively. It is quite probable that the group contained some individuals who had had undiagnosed typhoid fever, in which case their blood sera would have protected mice against a much higher number of m.l.d. Obviously, the use of a single fixed dose of organisms, the technic first adopted for all preliminary titrations, even though it amply sufficed to pick out the non-immunes, would give no definite information concerning immunes. In our more recent work we are expanding the dosage in such manner as will enable us to secure the end point in all preliminary titrations.

A group of 200 individuals was studied with a view to determining the protective antibody content of the blood serum shortly after immunization. In each instance, the blood was taken on the 14th day after the third inoculation of typhoid vaccine. No one of this group had received more than the one course of vaccine, and none gave a history of having had typhoid fever. The results are shown in Table II, and are expressed in multiples of the m.l.d. of the test organism against which 0.1 c.c. of the individual's serum completely protected mice.

The results of the tests, as shown in Tables II, III, and IV, are expressed in terms of complete protection afforded mice against multiples of the m.l.d. for mice of a virulent strain of the typhoid bacillus suspended in mucin (5 per cent). A strain designated in our laboratories as Strain No. 63 was used for this purpose.

It will be noted in Table II that 2 weeks after vaccination the blood sera protected mice against from a mini-

TABLE II

Protective Antibody Content of Blood Sera of 200 Persons 2 Weeks After Vaccination. Results Are Expressed as Number of Minimum Lethal Doses of the Test Organism Against Which the Serum of the Immunized Individual Protected Mice

<i>Minimum Lethal Doses</i>	<i>Number of Persons</i>	<i>Percentage</i>
1,000,000	4	2.0
100,000	35	17.5
10,000	121	60.5
1,000	40	20.0
Total	200	100.0

um of 1,000 to a maximum of 1,000,000 m.l.d. of the test organism. In 80 per cent of the observations, the sera protected against at least 10,000 m.l.d.

Three groups of individuals have been studied with regard to the duration of immunity for varying periods of time. In one group, consisting of 56 persons, the blood sera were retitrated from 12 to 17 months after the initial vaccination. In another group of 30 individuals, the blood sera were retitrated after an interval of from 24 to 29 months subsequent to initial vaccination. In all instances, the individuals comprising these two groups were immunized with vaccine made from a virulent strain (Strain No. 58) and the blood sera had been titrated 2 weeks after initial vaccination. None of those included in this study gave a history of previous vaccination or of having had typhoid fever. The results obtained are shown in Table III.

It is apparent that the number of observations in Table III are too few to permit drawing definite conclusions on a statistical basis. However, the results obtained, while subject to confirmation by additional studies, do indicate the trend in the persistence of immunity as conferred by immunization with typhoid vaccine, in so far as

TABLE III

*Protective Antibody Content of Blood Sera of 56 Persons 12 to 17 Months, and of 30 Persons 24 to 29 Months Subsequent to Vaccination with Typhoid Vaccine. Results Are Expressed in Minimum Lethal Doses of the Test Organism Against Which the Serum of the Individual Protected Mice **

Minimum Lethal Doses	12 to 17 Months After Vaccination		24 to 29 Months After Vaccination	
	No. of Persons	Percentage	No. of Persons	Percentage
10,000	12	21.4	1	3.3
1,000	27	48.2	13	43.4
100	17	30.4	9	30.0
10	..	....	6	20.0
1	..	....	1	3.3
Total	56	100.0	30	100.0

* Two weeks subsequent to vaccination these blood sera protected mice against from 1,000 to 1,000,000 m.l.d. of the test organism.

the mouse protection test can be used as a measure of the immunity possessed by the individual.

Twelve to 17 months after immunization the blood sera protected mice against from 100 to 10,000 m.l.d. of the test organism. Twenty-four to 29 months after vaccination the blood sera protected mice against from 1 to 10,000 m.l.d. (Table III).

During a period of 12 to 17 months subsequent to vaccination, the blood sera of 39 of the 56 individuals, or 69 per cent of the group, afforded mice complete protection against at least 1,000 m.l.d. of the test organism. Two years after vaccination the blood sera of 14 of the 30 individuals, or 46 per cent of the group, protected mice against 1,000 lethal doses of the test organism.

Despite the relatively great decrease in the protective antibody content of the blood in from 1 to 2 years subsequent to immunization, as measured by the mouse protection test, the average member of the groups observed, and the majority of the individuals involved, still have considerable immunity 1 year and 2 years after vaccination, as is indicated by the persistence of protective antibodies sufficient to pro-

tect mice against a relatively large number of minimum lethal doses of the test organism.

The third group consists of 311 individuals who had been vaccinated from one to several times, and among whom the time interval since the last vaccination ranged from 1 year to more than 10 years (Table IV). No data are available relative to the protective antibody content of the blood sera 2 weeks after vaccination, as for the groups discussed above (Tables II and III).

The blood sera of the members of the group who received their last course of vaccine 12 to 24 months previously protected mice against from 1 to 10,000 m.l.d. of the test organism. The blood sera of 62 per cent of this group protected mice against at least 1,000 m.l.d. These findings are comparable to those shown in Table III.

The blood sera of the members of the group vaccinated from 24 to 36 months before they were tested also protected mice against from 1 to 10,000 m.l.d., and 35 per cent of the sera protected mice against at least 1,000 m.l.d.

Thereafter, the protective antibody content of the blood sera of individuals

TABLE IV

Protective Antibody Content of Blood Sera of Previously Immunized Individuals at Different Periods of Time Subsequent to Last Vaccination. Results are Expressed in Minimum Lethal Doses of the Test Organism Against Which the Serum of the Individual Protected Mice

Minimum Lethal Doses	Time Since Last Vaccination									
	12-24 Months		25-36 Months		4-5 Years		6-10 Years		More than 10 Years	
	No. of Persons	Per cent	No. of Persons	Per cent	No. of Persons	Per cent	No. of Persons	Per cent	No. of Persons	Per cent
10,000	19	16.5	2	2.2	..	....	..	....	..	....
5,000	4	3.5	3	3.2	22	52.4	9	29.0	11	36.7
1,000	48	41.7	28	30.1	15	35.7	17	54.8	14	46.6
100	42	36.5	37	39.8	5	11.9	3	9.7	5	16.7
10	1	0.9	19	20.4	..	....	2	6.5	..	....
1	1	0.9	4	4.3	..	....	..	....	..	....
Total	115	100.0	93	100.0	42	100.0	31	100.0	30	100.0

last vaccinated from 4 to 5 years, 6 to 10 years, and more than 10 years prior to the time of testing decreased gradually and more slowly. While the numbers of persons involved in the 4 to 5 years, 6 to 10 years, and more than 10 years groups are relatively small, the results suggest that some degree of immunity persists for a long period of time—more than 10 years—after immunization with typhoid vaccine. It should be noted, however, that most of the members of these groups had been vaccinated two or more times.

COMMENT

Determination of the protective antibody content of the blood subsequent to immunization with typhoid vaccine, through the ability of the blood serum to confer passive immunity to mice, cannot be considered as measuring the total potential defense response of the immunized individual to typhoid fever. However, the production of immune substances and their presence in the blood, as shown by the mouse protection test, is a part of the response of

the defense mechanism of the tissues to the inoculation of typhoid vaccine, and is demonstrable evidence of immunity to infection with *E. typhosa*.

As shown in Table II, the degree of immunity present in different individuals 2 weeks after vaccination varies widely. At this time all of the blood sera tested protected mice against at least 1,000 m.l.d. of the test organism, and 80 per cent protected against at least 10,000 doses, 20 per cent against 100,000 doses, and 2 per cent against one million m.l.d. Immediate protective antibody concentration in the blood serum sufficient to protect mice against 1,000 minimum lethal doses of virulent organisms appears to represent the minimum immunity conferred by vaccination with typhoid vaccine, when given in three subcutaneous injections of 0.5 c.c., 1 c.c., and 1 c.c. at weekly intervals. As epidemiological evidence indicates that immunization with typhoid vaccine protects against infection for some time after vaccination, it is believed the assumption is justified that if the blood serum will protect against 1,000 m.l.d., the individual has suffi-

cient immunity to protect him against dosages of the organism ordinarily encountered in nature. Undoubtedly some, if not a large majority, of immunized persons whose blood sera will not protect mice against less than 1,000 m.l.d. are still immune to typhoid fever.

The data presented in Tables III and IV indicated that during the second year after immunization the blood sera of 69 per cent of a group of 56 persons, and 62 per cent of a group of 115 persons protected mice against 1,000 to 10,000 m.l.d. Also, that during the third year after vaccination the blood sera of 46 per cent of a group of 30 persons, and 35 per cent of a group of 93 persons protected mice against 1,000 or more m.l.d.

Not only does the degree of immunity produced by immunization with typhoid vaccine vary greatly in different individuals, in so far as can be judged by the mouse protection tests, but the duration of the immunity conferred by vaccine is also subject to wide variations. Because of these variations, it would be impossible to determine if any one person was immune at any given time, without testing his blood serum. However, it appears from the results of these studies that a large proportion of immunized persons are protected for at least 2 to 3 years after vaccination.

SUMMARY

Several groups of individuals have been studied with a view to determining, by means of the mouse protection test, the concentration of protective antibodies in the blood at intervals of time subsequent to immunization with typhoid vaccine.

Prior to vaccination, the sera of 79 per cent of one group of individuals tested failed to protect mice against 100 m.l.d. of a live virulent test organism, and 76 per cent of another

group failed to protect against 10 m.l.d. of the test organism.

Within 2 weeks after vaccination the antibody content of the blood sera tested increased rapidly to a comparatively high level. There was a relatively rapid decrease in circulating antibodies during the 2 year period subsequent to vaccination. Thereafter, the decrease was more gradual and 10 or more years after the last vaccination the antibody concentration in the blood was sufficient to suggest that a large proportion of the individuals tested still possessed considerable immunity to typhoid fever.

During the second year after vaccination, 69 per cent of one group of immunized individuals and 62 per cent of another group protected mice against 1,000 m.l.d. of the test organism. During the third year subsequent to immunization, 46 per cent of the blood sera of one group and 35 per cent of another group protected mice against 1,000 m.l.d. of the test organisms.

CONCLUSIONS

1. Experimental evidence based on mouse protection tests indicates that there is a material decrease in protective antibodies in the blood during the first and second years subsequent to immunization with typhoid vaccine.

2. The decrease in the protective antibody content of the blood is the greatest during the first 2 years after vaccination, and is comparatively slow thereafter.

3. The protective antibody content of the blood of the average individual for as long as 10 years subsequent to immunization with typhoid vaccine is sufficient to indicate that he still possesses considerable immunity to typhoid fever. The results obtained by this study suggest that persons who have been immunized with typhoid vaccine should be re-vaccinated from 2 to 4 years after initial vaccination.

RE-VACCINATION BY INTRACUTANEOUS INJECTION

Where immunization is employed to control typhoid fever in civilian com-

munities, or among troops, re-vaccination is usually considered necessary. It has been customary in re-vaccination against typhoid fever to use the same dosage of vaccine and the same methods of administering the vaccine as in original vaccination. That is, three subcutaneous injections of vaccine at about weekly intervals. This method is time consuming, and, not infrequently, in persons who have been vaccinated several times, causes rather severe reactions.

It is known that in immunizing against certain diseases other than typhoid fever, one dose of antigen will elicit an immunological response in previously immunized persons. In view of this, we have undertaken a study to determine if one dose of typhoid vaccine would stimulate the defense mechanism in previously vaccinated persons and, if so, the degree of response that results from such a stimulus.

A group of 100 individuals were each given one dose of 0.1 c.c. of typhoid vaccine (100 million organisms) intracutaneously in the arm or forearm. All had been immunized with typhoid vaccine from 2 to 10 years, or more, prior to re-vaccination. Some had received two or more courses of the vaccine.

Blood specimens were taken immediately before and 14 days after re-vaccination. The blood sera were titrated by the mouse protection test, using 0.1 c.c. of the individual's serum against multiple m.l.d. of the test organism (Strain No. 63 *supra*) for normal mice. The results are shown in Table V.

Before re-vaccination, the blood sera of members of this group protected mice against from 1 to 10,000 m.l.d. of the test organism. In 71 per cent of the observations the blood sera failed to protect mice against 1,000 m.l.d. and 21 per cent failed to pro-

TABLE V

Protective Antibody Content of Blood of 100 Persons Before Vaccination and 2 Weeks After Vaccination with 0.1 c.c. of Typhoid Vaccine Intracutaneously. The Protection Expressed as the Number of Minimum Lethal Doses of the Test Organism Against Which the Sera Protected Mice

A	
<i>Before Vaccination</i>	
<i>Protection in m.l.d.</i>	<i>Number of Persons</i>
10,000	1
5,000	2
1,000	26
500	10
100	40
10	16
1	5
Totals	100
B	
<i>Two Weeks After Vaccination</i>	
<i>Protection in m.l.d.</i>	<i>Number of Persons</i>
100,000	7
50,000	3
10,000	66
5,000	3
1,000	21
Totals	100

tect mice against 100 m.l.d. (Table V-A).

After re-vaccination, the blood sera protected mice against from 1,000 to 100,000 m.l.d. In 76 per cent of the cases, the blood sera protected mice against at least 10,000 m.l.d. (Table V-B).

COMMENT

The results of a study of the protective antibody content of the blood sera of 200 individuals 2 weeks after original vaccination with a series of three injections of typhoid vaccine have been tabulated in Table II. It will be seen that in this group 20 per cent of the sera protected mice against at least 1,000 m.l.d., and 80 per cent of the sera protected against at least 10,000

m.l.d. In comparison, in the re-vaccination of a group of 100 persons with one dose of vaccine (0.1 c.c.) administered intracutaneously (Table V), 21 per cent of the blood sera obtained 2 weeks after re-vaccination protected mice against 1,000 m.l.d. of test organisms, and 76 per cent protected mice against at least 10,000 m.l.d. Three per cent protected mice against 5,000 m.l.d.

The results of these two studies are comparable, and indicate that the immediate immunological response to re-vaccination with one intracutaneous injection of 0.1 c.c. of typhoid vaccine is approximately the same as that which occurs after the first vaccination with three subcutaneous injections of 0.5 c.c., 1 c.c., and 1 c.c., respectively.

Re-vaccination with one small intracutaneous dose of typhoid vaccine has the advantage that it is, obviously, a much simpler procedure than is a method requiring three subcutaneous injections at weekly intervals. Also, the reaction is, almost without exception, much milder than that produced by subcutaneous injection of 0.5 c.c. or 1 c.c. of the vaccine.

In this study the reactions produced by the vaccine have been consistently mild and of short duration. The local reaction consisted of an area of redness at the site of the injection, and in a few instances slight swelling of the tissues. The most severe systemic reactions observed consisted of mild malaise, headache, and myalgia. Involvement of the axillary lymph nodes was observed in 46 per cent of the cases, headache in 20 per cent, and rise in temperature in 8 per cent. The highest temperature noted was 101°. In many instances, those presenting mild reactions following the intracutaneous injection of the vaccine had a history of relatively severe reactions after subcutaneous injections of the vaccine.

Data are not yet available which would permit the comparison of the immediate or long range immunological response to re-vaccination with one intracutaneous dose of typhoid vaccine with that produced by re-vaccination with three subcutaneous injections at weekly intervals. This phase is being given further study and will be made the subject of a future report.

The duration of immunity following re-vaccination with one intracutaneous injection of 0.1 c.c. of the typhoid vaccine has not been determined, but will be investigated in the future.

SUMMARY

A group of 200 persons who had never been vaccinated were given three subcutaneous injections of 0.5, 1 c.c. and 1 c.c. respectively of the typhoid vaccine. A group of 100 individuals who had received from one to several courses of the typhoid vaccine from 2 to 10 years or more prior to the time this study was made were re-vaccinated with one intracutaneous dose of 0.1 c.c. of typhoid vaccine.

Two weeks after vaccination, the blood sera of those re-vaccinated with a single dose of 0.1 c.c. of the vaccine intracutaneously and of those vaccinated for the first time with three subcutaneous injections of the vaccine protected mice against a virulent strain of *E. typhosa* to approximately the same degree.

The results obtained indicate that the immunological response of the individual to re-vaccination with one dose of 0.1 c.c. of vaccine intracutaneously parallels that following the initial vaccination with three subcutaneous injections of 0.5 c.c., 1 c.c., and 1 c.c. of the vaccine at weekly intervals.

The reactions observed following re-vaccination with 0.1 c.c. of typhoid vaccine are mild as compared with those frequently produced by subcutaneous injection of the vaccine.

CONCLUSIONS

1. Re-vaccination against typhoid fever of previously immunized persons with one intracutaneous dose of 0.1 c.c. of typhoid vaccine produces an immediate immunological response which is comparable to that following original vaccination with three subcutaneous injections of the vaccine.

2. As compared with re-vaccination with three subcutaneous injections of the vaccine, re-vaccination with one small intracutaneous dose of vaccine is a simple and time saving procedure.

3. The reaction following the intracutaneous injection of 0.1 c.c. of typhoid vaccine is relatively mild as compared with that frequently produced by the subcutaneous injection of 0.5 c.c. or 1.0 c.c. of the vaccine.

REFERENCES

1. Siler, J. F. Typhoid Vaccine Studies: Investigation of Virulence and Antigenic Properties of Selected Strains of the Typhoid Organism. *A.J.P.H.*, 26:219-228 (Mar.), 1936.
2. Siler, J. F. Protective Antibodies in the Blood Serum of Individuals After Immunization with Typhoid Vaccine. *A.J.P.H.*, 27:142-151 (Feb.), 1937.

The Initiation of Social Medicine

STATISTICS indicate that professional, economic, and social factors influence mortality rates—a fact that has long been recognized, but until recently neglected by the medical profession.

Figures, quoted by Dr. René Sand in a paper presented to the Medical Society of Geneva, show that although mortality rates have been decreasing since the second half of the 19th century, the decrease has been proportional in all the social classes so the difference between the classes has varied little.

Public health and social medicine are becoming an increasingly important part of the medical curricula, as is shown by a survey of such courses in medical

schools. Eventually, it is believed, the medical course will be built around the normal person; the first year will be devoted to a study of normal physiology, followed in the succeeding years by courses in public health and by clinical work in which the social aspects of disease will be emphasized. The relationship of the medical profession to social medicine is yet to be established, but if the medical profession has had this training, the solution of the problem will be easier, happier, and quicker, and the individual members of the medical profession will be able to adapt themselves to the new situation more readily.—Dr. René Sand: *Revue Médicale de la Suisse Romande*, 18. 12:761-772 (Oct. 25), 1938.

Serologic Tests in the Diagnosis of Syphilis*

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THE Laboratory Section of the American Public Health Association has been interested for a number of years in the development of standard methods for the complement-fixation test for syphilis. Dr. Gilbert,¹ as referee, directed attention to establishing principles of technic, upon which leading serologists agreed, and which, if followed, might be expected to yield dependable results. So many phases of the technic rested upon a purely empirical basis that more complete information regarding the fundamental relationships that govern the reactions between the different reagents of the test was essential to further progress in standardization. After extended study, it has been possible recently to describe methods which permit a quantitative determination of the reaction and thus provide a rational basis for standardization of the test.²⁻⁴ Accurate measurement of the changes in complement activity that occur under the different conditions of the test depends upon the determination of the amount of complement required in each instance to give 50 per cent hemolysis, as well as upon the fact that constant and directly proportional relationships

exist between the increments of complement so required and the increments of serum or antigen used when these reagents are properly standardized and adjusted to give maximum interaction.

The new method was established as a routine procedure in the New York State Laboratory in April, 1937. The series of specimens⁵ provided by the U. S. Public Health Service[†] in its study to evaluate serodiagnostic tests for syphilis afforded an opportunity to study the results obtained in the "control tests" in comparison with those of the quantitative technic and of the method previously employed in New York State, which utilized the same reagents but was not quantitatively standardized.

The titer obtained by the quantitative method is the ratio of the amount of complement required for 50 per cent hemolysis in the presence of serum and antigen to that similarly required with serum alone. It is a numerical index of the activity of the serum. A titer of 1.0 indicates that the reaction of the serum is the same with or without antigen and a reaction of 1.5 indicates such a slight degree of activity that titers of 1 to 1.5 are

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† We are grateful to Dr. R. A. Vonderlehr and Dr. J. F. Mahoney of the United States Public Health Service for making available the complete clinical histories of these cases.

TABLE I

*Results of Quantitative Complement-fixation Tests
Federal Series, 1936-37 and 1938*

Type of Case	Titer of Serum											Not Tested	Total
	1.0	1.1	1.2	1.3	1.4	1.5	1.6-1.9	2-3	4-6	7-10	10+		
Healthy persons	127	46	16	7	1	1	0	0	0	0	0	2	200
Syphilitic cases	30	6	1	7	0	1	10	34	121	54	129	14	407

reported as "no reaction." In general, titers greater than 6 correspond with a degree of reaction previously reported as "4+." In the test for syphilis titers may range from 1 to 500 or greater, but, as a routine procedure, only those up to 10 are differentiated; the higher ones are at present reported as "greater than 10." In the vast majority of cases, the discrepancy between duplicate determinations is less than 25 per cent and is usually less than 8 per cent.

The results obtained with 198 of the non-syphilitic and with 393 of the syphilitic groups that were studied quantitatively are given in Table I.

None of the sera from healthy persons had titers exceeding 1.5; in fact, only one was as high as 1.5. The cases from which the sera of the syphilitic group were obtained consisted mainly of treated cases in which the serologic reaction is frequently the principal evidence of the activity of the disease. One hundred and twenty-nine of the syphilitic sera had titers greater than 10; 54 of 7 to 10; 121 of 4 to 6; 34

of 2 to 3; 10 of 1.6 to 1.9; and 45 of 1.5 or less.

The results obtained with the specimens that were tested both by our previous method⁶ and by the quantitative technic are given in Table II and record the variations in the reactivity of the different sera, which the older method of testing and reporting failed to indicate. While the majority of specimens with titers of 7 or greater gave complete fixation in the old form of test, there were 11 exceptions, one of which was a marked discrepancy. Also, with other groups of specimens, which in the quantitative test were shown to have similar degrees of activity, the reports varied. For example, of 55 specimens with titers of 4 to 6, 9 in the older test gave slight or partial reactions (\pm or $+$), while 24 gave complete fixation (4+). These discrepancies, occurring as they did in tests made under similar conditions and with the same antigen, were evidently due to the fact that a method not quantitatively standardized fails to provide in every

TABLE II

*Comparison of Results of Quantitative Tests with Those of the Method Previously Employed
Federal Series, 1936-37*

Previous Method	Titer of Syphilitic Sera in Quantitative Test							Total
	10+	7-10	4-6	2-3	1.6-1.9	1.5 or Less	Not Tested	
4+	60	27	24	1	0	0	8	120
3+	6	2	9	0	0	0	0	17
2+	1	1	13	2	0	0	0	17
+	0	1	8	9	0	0	0	18
\pm	0	0	1	7	1	0	0	9
—	0	0	0	0	4	12	0	16
Unsatisfactory	0	0	0	0	2	0	1	3
Total	67	31	55	19	7	12	9	203

TABLE III

Comparison of Titers in Quantitative Tests of Specimens from Cases of Syphilis with the Reactions Reported by Other Methods

Method	Titer in Quantitative Test (1936-37 Federal Series)																							
	10+				7-10				4-6				2-3				1.6-1.9				1.5 or Less			
	(67 Cases)				(31 Cases)				(55 Cases)				(19 Cases)				(7 Cases)				(12 Cases)			
	P	D	N	U	P	D	N	U	P	D	N	U	P	D	N	U	P	D	N	U	P	D	N	U
Complement-fixation																								
New York State—																								
previous method	67	0	0	0	30	1*	0	0	46	9	0	0	3	16	0	0	0	1	4	2	0	0	12	0
Kolmer	64	0	0	3	28	0	0	3	48	0	3	4	14	0	5	0	2	0	4	1	3*	0	9	0
Precipitation																								
Kahn Standard	66	0	0	1	29	0	1*	1	47	3	5	0	9	1	6	3	3	0	3	1	1*	0	11	0
Kahn Presumptive	66	0	0	1	30	0	0	1	52	0	3	0	13	1	2	3	4	1	1	1	4*	1	7	0
Kline Diagnostic	63	4*	0	0	30	0	1*	0	52	3	0	0	10	7	1	1	2	2	3	0	2*	2	8	0
Kline Exclusion	67	0	0	0	31	0	0	0	55	0	0	0	17	1	0	1	6	1	0	0	7*	3	2	0
Hinton	66	0	0	1	30	1*	0	0	51	0	2	2	17	0	1	1	6	0	1	0	3*	3	6	0

P = Positive D = Doubtful

N = Negative U = Specimen not tested, anticomplementary, or unsatisfactory due to hemolysis, breakage, leakage, or other causes.

* The reactions and clinical histories of these cases are listed at the end of this report.

° The reactions and clinical histories of these cases are listed at the end of this report.

instance conditions for maximum reaction and grades reactions in such a way that the reports have a quantitative connotation which is not always reliable. Fewer marked discrepancies in reports, however, were observed with the old test than with the methods of the "control" laboratories as shown in Tables III and IV which summarize their results in comparison with those

of the old and new methods of New York State. Discussion will be limited to those reports that must be considered widely discrepant; namely, the "doubtful" or "negative" reports on specimens with titers of 7 or greater, and the "positive" reports on specimens with titers of less than 2, since these are so striking as to warrant consideration in some detail.

TABLE IV

Comparison of Titers in Quantitative Tests of Specimens from Cases of Syphilis with the Reactions Reported by Other Methods

Method	Titer in Quantitative Test (1938 Federal Series)																							
	10+				7-10				4-6				2-3				1.6-1.9				1.5 or Less			
	(62 Cases)				(23 Cases)				(66 Cases)				(15 Cases)				(3 Cases)				(33 Cases)			
	P	D	N	U	P	D	N	U	P	D	N	U	P	D	N	U	P	D	N	U	P	D	N	U
Complement-fixation																								
Kolmer	62	0	0	0	23	0	0	0	63	0	3	0	13	0	2	0	0	0	3	0	1*	1	31	0
Eagle	60	0	1*	1	23	0	0	0	57	4	5	0	9	3	3	0	0	1	2	0	0	1	32	0
Precipitation																								
Kahn Standard	61	0	1*	0	22	0	0	1	52	7	7	0	9	1	5	0	1	0	2	0	0	1	32	0
Kahn Presumptive	61	0	1*	0	22	0	0	1	63	0	3	0	11	0	4	0	2	0	1	0	3*	0	30	0
Kline Diagnostic	61	0	1*	0	22	0	0	1	56	8	2	0	9	2	4	0	1	0	1	1	0	3	29	1
Kline Exclusion	62	0	0	0	22	0	0	1	66	0	0	0	13	2	0	0	2	0	0	1	3*	8	21	1
Hinton	59	0	1*	2	22	0	0	1	61	0	2	3	14	0	0	1	3	0	0	0	5*	0	32	1
Eagle Macro	59	1*	1*	1	22	1*	0	0	52	3	8	3	8	2	3	2	2	0	1	0	0	3	28	1
Eagle Micro	60	0	1*	1	23	0	0	0	58	1	4	3	11	1	1	2	2	0	1	0	1*	3	28	1

P = Positive D = Doubtful

N = Negative U = Specimen not tested, anticomplementary, or unsatisfactory due to hemolysis, breakage, leakage, or other causes.

* The reactions and clinical histories of these cases are listed at the end of this report.

° The reactions and clinical histories of these cases are listed at the end of this report.

The majority of specimens with titers of 7 or greater were reported as "positive" by all methods. However, "negative" reports were made on 6 and "doubtful" reports on 8 of these specimens. A description of the 14 cases is given at the end of this report. The serologic and clinical findings in 5 of these are reviewed briefly for purposes of illustration:

Case 273 F—Untreated *tabes-paresis*; titer greater than 10; all serologic reports positive except that of the Kline diagnostic precipitation test, which was doubtful.

Case 167 G—Syphilis of the central nervous system; no treatment; titer greater than 10; all serologic reports positive except those of the Kahn precipitation and the Eagle flocculation tests, which were negative.

Case 96 F—Latent; treated with two doses each of arsphenamine and bismuth; titer greater than 10; all reports positive except that of the Kline diagnostic test, which was negative.

Case 8 G—Cardiovascular; no treatment; titer over 500; all serologic reports positive except that of the Hinton precipitation test, which was negative. It is of interest that the Kolmer test was only moderately positive in this case which, of all those examined, had the highest titer in the quantitative test.

Case 70 G—Syphilis of the central nervous system with history of "4+" spinal fluid; untreated; titer greater than 10; all reports positive except that of the Eagle complement-fixation test, which was negative.

The clinical histories, as well as the results of the serologic tests, strongly suggest that the doubtful or negative reports made in these cases were attributable to faults in standardization which resulted in prozone effects.

Similar discrepancies occurred in reports of tests with specimens that had titers between 2 and 6 but, as mentioned above, these are not discussed since the conditions underlying the variations in each instance are not so apparent as in the case of the discrepancies of greater degree.

Titers of less than 2 represent such low degrees of reaction that the significance of each can be interpreted only in the light of the clinical signs

and history of the individual. Fifty-five specimens fall in this category. Forty-five had titers of 1.5 or less; 21 of these were negative in all tests and only one, No. 244 F, reacted to some degree in all. The cases in which the reports made by different methods were widely discrepant are listed at the end of this report. A review of the serologic and clinical findings in a few of them serves to illustrate the type of discrepancy that occurred.

Case 261 F—Symptomless; treated from May, 1934, to December, 1936: 14 doses neoarsphenamine, 16 bismarsen, and 61 bismuth intramuscularly; last treatment about one month ago; titer 1.3; all reports negative except those of both the diagnostic and exclusion precipitation tests of Kline, which were positive.

Case 277 G—Primary; between March, 1934, and February, 1938, the patient received 19 doses of arsphenamine and 27 of bismuth; titer 1.0; all tests negative except that of Kolmer, which was positive.

Case 256 F—Tertiary; although no treatment had been given, the reaction was negative in all except the Kahn presumptive and the Kline exclusion tests, which were positive.

Case 289 G—Primary; between August, 1927, and February, 1938, the patient received 62 doses of arsphenamine, 60 of bismuth, and mercury and potassium iodide for 12 months; titer 1.0; all reports negative except that of Hinton, which was positive, and that of the Kline exclusion test, which was doubtful.

In all, positive reports were made by at least one method with 18 different specimens in the group with titers of 1.5 or less. While in certain instances further information would be needed to determine to what extent the reports were discrepant, the general character of the clinical and serologic findings of the cases in this group was quite different from that of the discrepant cases in the group with titers of 7 or greater; clinically they were in large part well treated and the majority of the serologic reports were negative. Thus the findings, as a whole, suggested that any activity present was probably slight in

degree. Yet the "positive" reports made in such cases have the same connotation as those with sera of high degrees of specific activity when both are simply recorded as "positive" and, it would seem, would confuse and mislead the physician and certainly fail to give him complete information.

In occasional cases of syphilis, reactions may occur in certain tests and not in others, and the clinical signs or history may indicate less clearly than in the examples cited the nature of the discrepancies, so that the question arises whether the particular antigen is responsible for the reaction that occurs. In the tests for syphilis, the antigens that are used are very similar in nature so that when they are adequately standardized they might be expected to react in a uniform manner. The quantitative technic should be of particular value in the further study of such cases since it provides a means of determining readily the relative value of different antigens and thus affords a serologic control of different technics of complement-fixation or precipitation that has previously been lacking.

SUMMARY

In closing, it is important to stress several points which stand out clearly from a consideration of the comparisons made in this report. The consensus of the serologic results corresponded with those of the quantitative titration and with the clinical findings. The occasional doubtful and negative reports, however, which were made by the different methods with specimens of high titer in the quantitative test, suggest faults in standardization that result in prozone effects. Further, the practice of limiting reports to "positive,"

"doubtful," or "negative" not only does not serve the clinician adequately, but unfortunately, also fosters the trend for serologists to oversensitize the technic and to report as "positive" the results with sera of relatively slight or doubtful activity. Positive reports with such sera cannot have the same significance as with those of marked activity. Certainly, methods of reporting which fail to distinguish them are misleading to the physician. Finally, reports of "positive," "doubtful," or "negative" connote a laboratory diagnosis whereas the clinician has full responsibility and, with complete information, he, not the laboratory, should make the diagnosis.

It is believed that a quantitative evaluation of the specific activity of a serum which the new method of complement-fixation affords, provides a reliable basis for the standardization of serologic tests and should prove, with clinical experience, an essential guide to the more effective treatment and control of syphilis.

REFERENCES

1. Gilbert, Ruth. Standardization of the complement-fixation test for syphilis. *Am. J. Syph.*, 17:238-281, 1933.
2. Wadsworth, Augustus, Maltaner, Frank, and Maltaner, Elizabeth. Quantitative studies of the complement-fixation reaction with tuberculous immune serum and antigen. *J. Immunol.*, 35:93-103, 1938.
3. Wadsworth, Augustus, Maltaner, Frank, and Maltaner, Elizabeth. Quantitative studies of the complement-fixation reaction with syphilitic serum and tissue extract. *J. Immunol.*, 35:105-115, 1938.
4. Wadsworth, Augustus, Maltaner, Frank, and Maltaner, Elizabeth. Quantitative studies of the complement-fixation reaction with syphilitic serum and tissue extract: Technic of the practical quantitative test. *J. Immunol.*, 35:217-234, 1938.
5. Parran, Thomas, and others. Serodiagnostic tests for syphilis as performed by thirty-nine state laboratories. *J.A.M.A.*, 109:425-430, 1937.
6. Wadsworth, A. B. *Standard Methods of the Division of Laboratories and Research of the New York State Department of Health*. Baltimore, Williams & Wilkins, 1927, p. 177.

ceived 25 injections of bismuth salicylate 0.15 gms.(m); also 2 mos. of Hg. rubs and KI gtt's 15 T I D

Temperature: 98.8; last meal 1 hr. 30 min.; 1½ oz. whiskey prior to collection of specimen

Titer: 7.3; all reports positive except that of the Kahn standard test which was negative

Case 62 F

Age 25; female, white

Diagnosis: latent, treated

Treatment: 11.16.34 to 1.8.37 = 21 injections arsphenamine 0.3 gm (v); 26 injections bismuth salicylate 0.15 gm (m); 4 mos. of mercury rubs (HS) & KI gtt' X T I D

Temperature: 99; last meal 6 hrs.

Titer: 7; all reports positive except that of the Hinton test which was doubtful.

Case 75 F

Age 26; male, white

Diagnosis: congenital, treated

Treatment: (1) in 1927 received 4 injections arsphenamine 0.4 gm (v)

(2) 12.2.35 to 1.11.37 = 30 injections arsphenamine 0.3 gm (v) and 30 injections bismuth salicylate 0.15 gm (m); 6 mos. Hg. rubs and KI gtt's 15 T I D

Temperature: 99; last meal 2 hrs. 20 min.

Titer: 6.7; all reports positive except that of the New York State test which was doubtful, and the Kolmer test for which no specimen was received

RECORD OF CLINICAL AND SEROLOGIC FINDINGS IN THE CASES WITH TITERS OF 1.5 OR LESS IN WHICH POSITIVE REPORTS WERE MADE WITH ONE OR ANOTHER OF THE DIFFERENT TESTS

Case 2 F

Age 23; male, colored

Diagnosis: asymptomatic

Treatment: (1) Jan. 1936 = 4 to 6 arm injections

(2) 7.4.36 to 9.23.36 = 3.7 gms. arsphenamine in 15 injections

(3) 9.23.36 to 11.5.36 KI gtt's. 10 T I D and mercury rubs at bedtime

Temperature: 98.4; last meal 2 hrs. 10 min.

Titer: 1.3; all reports negative except that of the Hinton test which was positive and those of the Kahn presumptive and Kline exclusion tests which were doubtful

Titer: 1.3; all reports negative except those of the Kline exclusion test which was doubtful and the Hinton test which was positive

Case 13 F

Age 19; male, colored

Diagnosis: asymptomatic

Treatment: 8.13.36 to 11.11.36 = (1) 4 injections arsphenamine 0.3 gm (v); (2) 7 injections bismuth salicylate 0.15 gm (m)

Temperature: 98.6; last meal 1 hr. 30 min.

Titer: 1.1; all reports negative except those of the Kahn presumptive, the Kline exclusion, and the Hinton tests which were positive

Case 261 F

Age 32; male, white

Diagnosis: symptomless; Wass. 4 plus Feb. 9 and 13, 1934; Kahn 3 plus and neg. Wass. on 5.16.34—all others including spinal serology have been neg. except for state lab. report of Kahn 2 plus and neg. Wass. on 3.5.36

Treatment: From 5.6.34 to 1.13.37 has had 14 neo., 16 Bismarsen and 61 bismuth intramusc. Last Rx about 1 month ago

Temperature: normal; last meal 3 hrs.

Titer: 1.3; all reports negative except those of the Kline exclusion and Kline diagnostic tests which were positive

Case 243 F

Age 28; male, white

Diagnosis: latent LI in May 1935

Treatment: 5.31.35 to 5.11.36 Neo 21 injections; 5.31.35 to 8.23.35 Hg. sol. 12 injections; 5.5.35 to 1.6.37 34 injections

Temperature: 98.6; last meal 3 hrs.; 4 beers prior to collection of specimen

Titer: 1.1; all reports negative except Kline exclusion which was positive and the Kline diagnostic and Hinton which were doubtful

Case 68 G

Age 22; male, white

Diagnosis: tertiary latent; Bl. Kahn 4+

Treatment: Neo and Bi q. week past 4 mos.

Temperature: 98.6; last meal 2 hrs.

Titer: 1.1; all reports negative except those of the Kahn presumptive, and Kline exclusion tests which were positive, and the Kline diagnostic and Eagle micro-flocculation tests which were doubtful

Case 308 G

Age 25; female, colored

Diagnosis: secondary

Treatment: 3.9.37 to 2.21.38—15 Bi and 3 ars.

Temperature: 98.6; last meal 1 hr. 30 min.; 2 oz whiskey prior to collection of specimen; 2d day of menstruation

Case 64 F

Age 52; male, white

Diagnosis: latent, treated

Treatment: 3.17.36 to 1.4.37=14 bismuth salicylate 0.15 gm (m) and 6 bis. sod. tartrate 2 cc. (m); had 10 intramuscular injections from family doctor in June and July 1936

Temperature: 99; last meal 2 hrs. 45 min.

Titer: 1.0; all reports negative except that of the Kline exclusion test which was positive

Case 67 F

Age 59; female, white

Diagnosis: latent, treated

Treatment: 1.31.20 to 1.18.37 arsphenamine 0.4 gm (v) x 13; 9 mos. Hg. rubs and KI gtt 15 T I D; bismuth salicylate 0.15 gm x 35; neoarsphanamine 0.2 gm (v) x 2; several spinal drainages

Temperature: 99; last meal 4 hrs.

Titer: 1.0; all reports negative except that of Kolmer which was positive, and those of the Kline exclusion test and the Hinton test which were doubtful

Case 70 F

Age 44; male, colored

Diagnosis: latent, treated

Treatment: 1930=8 arm injections by local doctor; 1.28.31 to 1.18.36=bismuth salicylate 0.15 gm (m) x 104; 20 months of Hg rubs and Potassium Iodide gtt 15 T I D

Temperature: 98.4; last meal 10 hrs.

Titer: 1.0; all reports negative except that of the Kline exclusion test which was doubtful and that of the Hinton which was positive

Case 244 F

Age 60; male, white

Diagnosis: tertiary lues (hepatic); patient showed no signs of syphilis beyond a strictly positive blood test; spinal fluid findings negative; died February 3, 1937 of cirrhosis of the liver; no autopsy

Treatment: antiluetic treatment many years ago

Temperature: 98; last meal 4 hrs. 30 min.

Titer: 1.0; New York State report was negative; Hinton report was doubtful; all others positive

Case 256 F

Age 33; female, black

Diagnosis: tertiary

Treatment: none

Temperature: 99.8; last meal 2 hrs.

Titer: 1.0; all reports negative except those of the Kline exclusion and the Kahn presumptive which were positive

Case 59 G

Age 50; male, colored

Diagnosis: now has latent lues; infected in 1935; 4+ Wass.

Treatment: in 1936 26, in hip, Bi; 26 neo in arm

Temperature: 98.6; last meal 2 hrs.

Titer: 1.0; all reports negative except those of Kahn presumptive and Kline exclusion and Hinton which were positive, and Kline diagnostic and Eagle micro-flocculation which were doubtful

Case 69 G

Age 26; male, white

Diagnosis: tertiary latent; Blood Kahn 4+

Treatment: none

Temperature: 98.6; last meal 2 hrs. 30 min.

Titer: 1.0; all reports negative except those of the Kahn presumptive and Kline exclusion which were positive, and the Kahn standard and the Kline diagnostic which were doubtful

Case 277 G

Age 42; male, white

Diagnosis: primary, treated

Treatment: 3.21.24 to 2.11.38 received 19 ars. and 27 bi.

Temperature: 100.2; last meal 1 hr. 40 min.

Titer: 1.0; all reports negative except that of Kolmer which was positive

Case 289 G

Age 25; female, white

Diagnosis: primary

Treatment: 8.7.27 to 2.16.38 received 62 ars., 60 bi., and 12 mos. Hg. and Ki inoculations

Temperature: 99; last meal 8 hrs.

Titer: 1.0; all reports negative except that of the Kline exclusion test which was doubtful and the Hinton test which was positive

Case 300 G

Age 49; male, colored

Diagnosis: primary

Treatment: 1924 to 2.18.38, 18 ars., 10 Bi., and 2 mos. Hg and Ki

Temperature: 98.6; last meal 6 hrs.

Titer: 1.0; all reports negative except the Eagle complement-fixation test which was doubtful and the Hinton test and the Eagle microflocculation test which were positive

Case 311 G

Age 20; female, colored

Diagnosis: ? primary

Treatment: 10.30.35 to 2.21.38—41 ars., 41 Bi., and 6 mos. Ki+Hg

Temperature: 98.4; last meal 2 hrs. 45 min.; 2d day of menstruation

Titer: 1.0; all reports negative except that of the Kline exclusion test which was doubtful and the Hinton test which was positive

Case 121 F

Age 19; male, colored

Diagnosis: primary chancre without secondaries in which treatment had been

instituted on 3rd day of lesion, at clinic; Bl. Wass. 2+

Treatment: 6 intravenous neo before admittance to hospital with ischio rectal abscess and primary lesion involuting; 3 I.V. neo and 3 intramuscular bismuth since entry

Temperature: 98.6; last meal 4 hrs.

Titer: 0.9; all reports negative except Kahn presumptive and Kline exclusion which were positive and Kline diagnostic which was doubtful

Do We Save Life?

MY point is obvious: If we save a man from death by tuberculosis we save him for death by something else. We may postpone death but what we really save is health. That is eminently worth saving whether life be prolonged or no. Indeed the mere prolongation of life without the conservation of health may well become a disaster, social no less than personal.

. . . It is estimated¹ that by 1975 the population 20 to 44 years of age

will have increased by only 6 per cent but the population 45 to 64 years of age will have increased by 69 per cent. Unless the generation now in high schools and colleges can be delivered from the invalidisms of middle age they will become an intolerable burden upon their offspring.—J. Rosslyn Earp, *New York State J. Med.*, Dec. 15, 1938, p. 1560.

REFERENCE

1. The Problem of a Changing Population Report, National Resources Committee, page 8, May, 1938.

Nursing Service of the State Health Department*

As Seen by the Private Agency

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THE general aim of the nursing service of the state health department is to assist in the promotion of the health of all the citizens of the state. It accomplishes this aim chiefly by helping each locality to provide and maintain proper local nursing services of good standard. We see, then, the state health department nursing service as a standard making and promoting force, interested in both public and private agencies and concerned with maternity service, control of communicable disease, the care of the sick, and the health supervision of the well.

If the state nursing service is to fulfil its large responsibility toward local services, it needs to be part of a modern well set up state health department; to serve all of the bureaus of the department, and to be on terms of good relationship with each of them. Moreover, it needs qualified leadership, sufficient nursing personnel, and an adequate budget, in order to have an adequate program.

Such a state nursing service profits by close association with all other state-wide forces working for health—professional organizations covering such fields as medicine, nursing, education, home economics, and social work; and lay groups, especially those with formulated health programs.

We can also see the state nursing service as an essential link in the chain between local and national health services. The national agencies help to set standards, to develop principles of action, to make studies, and to outline programs. These are all done in the hope that they will extend and improve local health services, but the jump from a national to a local service is often too great. Increasingly, the state health departments are looked upon as the intermediary.

This brings us to a wish made by Katherine Tucker in 1932, "to have in each state department of health an adequate budget for a state public health nursing service which would provide for a well qualified personnel in sufficient numbers to carry on a public health nursing service requisite for each state."¹

* Read before the Public Health Nursing Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 26, 1938.

That wish is gradually being answered as a comparison of the situation in 1931 with that in 1937-1938 shows:

reau. Interest in the subject is reflected by the fact that we received replies from 100 per cent of our inquiries.

TABLE I

The Type of Public Health Nursing Organization in State and Territorial Health Departments in 1931 and 1937²

Type of Organization	1931	1937	1938
Separate bureau or division	9	21	26
Unit under central administration	2	7	6
Unit under local health work	3	5	5
Unit under division of maternal and child health	24	18	14
Total states and territories providing a public health nursing consultant service	38	51	51

Further progress is noted by a comparison of the 1931 report, "Public Health Nursing in State Health Departments" made by the National Organization for Public Health Nursing, with a report made in 1935 by a joint committee of the American Public Health Association and the National Organization for Public Health Nursing. In the foreword to the 1931 report Sophie Nelson says, "The material indicates that the practice is so variable that it is not possible to draw any conclusions which might lead to formulation of principles."³ The later study made in 1935 went a long way in developing a carefully prepared statement of the functions of nursing service in state health departments and tentative suggestions for performing these functions.⁴

Inasmuch as we have this excellent statement of functions and methods plus the many suggestions put forth by Miss Tucker and Miss Nelson in the papers already referred to, we are laying the emphasis in this paper on what the private agencies want of the state health departments, and how the states can or would like to fill these needs. Our paper is based on inquiries sent to 10 visiting nurse associations of varying sizes and widely distributed geographically. We also wrote 4 state health departments, the U. S. Public Health Service, and the U. S. Children's Bu-

What does the private public health nursing agency expect, hope for, and need from the nursing service of the state health department? Moral support! The director of a large eastern city agency says, "Because our state health department concentrates its services more in the rural areas it is difficult to know how the large private city agency should use it. However, it gives us a feeling of stability to know there is a good state health department behind us that will set the standards for all health work in the state."

Liaison agent! Another large city agency looks to the public health nursing division of the state health department to provide connection with nurses out in the state, if the agency wishes to take up any matter in an individual county.

"We use the state nursing staff of specialists in our program of staff education" says another large city service in the middle west. "We consult the Division of Public Health Nursing regarding possible applicants for vacancies on our staff and seek stipends for staff nurses who prefer to work in the rural field."

The smaller nursing service hopes for all the services that her big city sister wants and more! "We believe," says the director of a comparatively small agency in the deep south, "that another very helpful project would be a good

circulating library. This, of course, would consist of the current new professional books and should be kept right up to date."

"Naturally we small organizations cannot afford a maternity, tuberculosis, or mental hygiene supervisor," states a philosophic visiting nurse association director from the state where the tall corn grows. "It seems to me there is a chance for much help in staff preparation through the use of the special supervisors in the health department."

From the far Northwest where private agencies are few and far between, a small visiting nurse association uses the state health department "for help in devising better methods of working with and through lay committees."

Private public health nursing agencies, large and small, from east, west, north and south and in between, look to the state health department to set standards and furnish support in maintaining them. They seek help in improving their service through the state's leadership and participation in staff education programs. They want help in keeping up to date in special fields through consultant service available from the state health department. They look upon the state health department as an agency which can collect information, new ideas and accounts of interesting experiments, and distribute them through bulletins, libraries, institutes, speakers, literature, correspondence, and other means. They use this state-wide agency for a place to find nurses for jobs and jobs for nurses. They seek, in return for providing a practise field for new nurses, stipends for scholarships for their own staff nurses. One director of a large visiting nurse association on the Pacific Coast summarizes the ways in which the state health department could provide better service to the private agency as follows:

1. Assuming responsibility for placement of

public health nurses in the state, both in private and public agencies

2. Being ready to act in an advisory capacity to private agencies as well as public

3. Keeping communities informed as to trends in public health nursing and its administration

4. Sponsoring educational programs, institutes, and conferences in urban as well as rural areas

This is a big order for any agency. Can the state health department meet these demands?

The Division of Public Health Nursing in the State Bureau of Health in Maine states that all nurses in private agencies are included in the staff education institutes and are given the opportunity to participate in the discussions and in taking definite part in the program. "We would like to see better coöperation between the local private and official agencies themselves, and better reporting to the State Health Department of work accomplished."

"We have a lending library from which all nurses can borrow," reports the Chief of the Bureau of Public Health Nursing in Indiana. "Our *Public Health Nursing Manual* is available for all nurses who request it. All news bulletins of any kind go to all the public health nurses in the state. Nurses employed by private agencies are eligible for fellowships for further training in public health nursing which we have available through Social Security Funds. . . . We would like the private agencies to remember that the nurses in the State Health Department need the stimulation that the agency's consultants can give us through visits at our office, conferences in the field, and permission for our staff to visit their agency to gather new ideas. Don't forget that private agencies were the first to develop public health nursing services both locally and in state health departments." They also furnish most of the opportunities for student practice and observation.

"As you are probably aware," writes the Director of the State Division of Public Health Nursing in Oregon, "we have only one private agency in the State of Oregon giving nursing service. To that association we supply credentials of qualified nurse applicants and give advisory service concerning problems of organization and administration as needed. We hope the nurses on the staff feel they may participate more actively in our educational program and make wider use of our consultant service and library facilities."

New York State offers "an arbitration service for both official and non-official agencies with thought for the integrity of the nonofficial agency when certain critical situations or opportunities arise as, for instance, discouraging employment of nurses by welfare authorities when service for indigent persons could be bought from existing visiting nurse associations."

There is precedent and experience to prove both that private agencies have not looked and will not look in vain to the nursing services of state departments of health for the services they need and that the state health departments not only appreciate the rôle of the private agency in trying out and perfecting new ideas and in providing practise fields and experience for nurses needed so badly in rural areas, but also that they take very seriously their obligation to all agencies which are contributing to the public health program.

These statements would indicate that the staff of the state nursing services must act as counsellors, teachers, judges, vocational and placement secretaries, and leaders in public health nursing—in other words, they must be the best nurses in the country. Both private and official agencies have a responsibility for demanding the type of machinery that will assure the careful selection of personnel and provide suitable administration and security in the job so they

may contribute to their fullest extent.

Marion Sheahan, Director, Division of Public Health Nursing, State Department of Health in New York, writes:

A nonofficial agency thinking of the total health of the community is limiting its usefulness if it does not understand and influence the appointments of personnel capable of providing leadership for a whole program, working out the part of the whole program to which a nonofficial agency can best contribute and then continuing to influence the conduct of the program so there is an integrated community service. I believe this might even extend to the initiation of a nonofficial agency by the official agency leader where one is indicated but does not exist.

Pearl McIver, Senior Public Health Nursing Consultant of the U. S. Public Health Service, writes:

You will remember that I have believed for some time that the plan of organization in a state health department was not so essential as the attitude toward nursing of the commissioner and other division directors. However, our experience from the past few years has led me to believe that nursing should be organized as a separate bureau on a par with all other activities of the state health department. This does not mean that it would function as a separate entity. To be successful, it must be very closely correlated with the work of all other divisions. It naturally follows that there should be a strong person in charge of local health activities who will be the coördinator for the work of all divisions which have to do with local health services. This would include nursing, sanitation, child hygiene, tuberculosis control, syphilis control, dental hygiene, etc.

This statement ties in with the recommendation made in "Nursing in State Health Departments"⁴:

To coördinate service of all public health nursing in the department of health, a unit of nursing headed by a well qualified public health nurse, is necessary. The conclusion that a unit is needed has already been reached by the Inter-departmental Committee for Coördinating Health and Welfare Activities of the federal government.

Naomi Deutsch, Director, Public Health Nursing of the Children's Bureau, suggests another item for our discussion:

What provision for coöperation with professional groups of nurses is there in the health department, such as representation on board of health, representation on advisory committee or through an advisory committee on public health nursing.

This has reference to

... representation from public health nursing groups on advisory committees to the state health departments, such as the general advisory committee to the department and advisory committees to separate divisions, particularly those of maternal and child health, public health nursing, services to crippled children, etc. Such types of representation are being more and more encouraged and are quite prevalent in the maternal and child health services and services to crippled children.

It would seem then, that if the state nursing service is to be in a position to help the private agencies, a unit of public health nursing under qualified nursing direction is an essential. Also some plan for public health nursing representation on advisory committees makes for smooth coöperation. It is interesting to note that both of these essentials have been recommended by the National Organization for Public Health Nursing as far back as 1926.

We would like to suggest that the nursing staff of the state health departments develop a definite plan for visiting the private agencies, to review with them questions of organization, administration, staff education and program, both in terms of content and of the extent to which the program reaches into the community. And why not reverse the procedure by suggesting that the directors of the private agencies make a practice of visiting the state health department office once a year, or once every other year? Is it not important for us to see the set-up and review the program on the ground?

Let us pause here to speak in more detail of staff education. Is there any better way of developing a community viewpoint among local nurses than to bring together into a joint staff meeting

the members of the local public and private agency staffs? Should not each know the program, technics and teachings of the other? and should not the effectiveness of both services in qualitative and quantitative terms be studied jointly? It would seem that the state health department nurses were the logical instruments to bring this about.

Effective team work between private local agencies and the state nursing services depends on two factors. The first is that the state accepts the responsibility of helping the private agencies and is equipped to do so. The second is that the private agencies recognize the state nursing service as in a position of leadership, and request consultation and advice from it. Undoubtedly the states which are making greatest progress are those in which the public and private agencies, both local and state, have learned to play the game together. May their tribe increase!

In conclusion, let us look at the national picture. Since the passage of the Social Security Act, we have been tremendously strengthened by consultant public health nursing services in two governmental agencies, the U. S. Public Health Service and the Children's Bureau, each with 5 regional consultant nurses under excellent leadership from Washington. In addition, several private national groups are in the public health nursing picture. Among them are:

National Organization for Public Health Nursing

American Red Cross

National Society for the Prevention of Blindness

American Social Hygiene Association

Maternity Center Association

John Hancock Mutual Life Insurance Company

Metropolitan Life Insurance Company

Each of these provides nurses who visit the states and many of them visit local services within the states.

It would seem that the objective of each would best be reached if the work were carried on as much as possible through the state nursing services. Up to now, the opportunity for this has been limited by the limitations of the states themselves. Increasingly, we hope the state nursing services will be kept better informed of the programs and methods of each national group. This can be brought about in part by more frequent individual conferences between the representatives of national agencies and the state nursing staffs. One practical device is the sending of itineraries of national representatives to the states.

This question of the desirable interplay between private agencies and state nursing services presents many problems of relationships—local to local, local to state, state to national, and then the whole series in reverse order. This brings new emphasis to our need for and dependence on one national agency equally interested in us all—the N.O.P.H.N. Anew we realize that the National Organization for Public Health Nursing is a clearing house. Through it, we may all clear our ideas, our successes and failures; and from it, we get guiding principles and generally accepted practices which we in turn adapt to fit the needs of the locality or state.

In a general sense, the N.O.P.H.N. may be thought of as the operating part of the Public Health Nursing Section of the American Public Health Association. Through the Section we have the opportunity of participating in all other branches of public health work and of learning how to integrate our part with the whole. Through the N.O.P.H.N. we try to put public health nursing into successful operation.

We are in a period of great stimulation of public health nursing. There are new emphases, new methods, and new funds. Public and private agencies are both necessary, and upon their ability to play the game together will the aim of better health for all the people be reached.

REFERENCES

1. Tucker, Katharine. Relation of State Public Health Nursing to Local Services. *Pub. Health Nurs.*, July, 1932.
2. Public Health Nursing in State Health Departments as of January 1, 1937. *Health Officer*, Nov., 1937.
3. Tattershall, Louise M. *Public Health Nursing in State Health Departments and State Boards of Education*. Published by the National Organization for Public Health Nursing, 1932.
4. Nursing in State Health Departments. An abstract of an unpublished report of the Joint Committee of the American Public Health Association and the National Organization for Public Health Nursing—To Study Nursing Services in State Health Departments, presented to the Nursing Section of the American Public Health Association at the 65th Annual Meeting, New Orleans, La., October 21, 1936.

Studies on Trichinosis*

XI. The Epidemiology of *Trichinella spiralis* Infestation and Measures Indicated for the Control of Trichinosis

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TWO years ago we inaugurated in the National Institute of Health a basic study designed to determine the extent of the trichinosis problem in the United States and to provide information which might aid in outlining a working program for the control of this disease. This study is based on the examination for trichinae of diaphragm material from cases coming to necropsy in hospitals, the cases representing routine hospitalizations unassociated with either clinical or anatomical diagnoses of trichinosis. Each diaphragm included in this study has been examined by two different methods, the direct microscopic method and the digestion-Baermann method, both of which have been described in detail by Hall and Collins¹ and by Nolan and Bozicevich.²

At this writing there has been examined a total of 3,000 diaphragms divided into several different series according to the origin of the material. These various series are, as follows:

1. A base series comprising diaphragms received from 10 hospitals in Washington,

D. C., 2 U. S. Marine Hospitals, and 4 U. S. Naval Hospitals on the east coast.

2. A random series comprising diaphragms received from 51 hospitals in 19 states, the hospitals being selected purely at random and the diaphragms representing random samplings of cases coming to necropsy in these hospitals.

3. A so-called "negative" series comprising diaphragms from certain hospitals in states in which no cases of clinical trichinosis had ever been reported.

4. A traumatic series comprising diaphragms from persons meeting traumatic death and not hospitalized, designed to negate the criticism that a previous trichina infestation may have influenced the hospitalization of some of the cases represented in the other series.

5. A Jewish series comprising diaphragms from orthodox and unorthodox Jews, designed to ascertain the value of the Mosaic Code in preventing trichinosis under complex modern conditions.

Table I presents the results of the examination of diaphragms in the various series.

The basic series comprising over 2,100 diaphragms at this writing shows a trichina incidence of 16.8 per cent, and the random and negative series show incidences of 18.3 and 18.6 per cent, respectively, figures which are within 2 standard deviations of findings in the base series. The traumatic series, with yet a relatively small num-

* Read before the Laboratory Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 26, 1938.

TABLE I

Results of Examination of 3,000 Diaphragms for Trichinella spiralis

Series	Number of Diaphragms Examined	Number of Diaphragms Positive	Per cent Positive
Basic	2,174	366	16.8
Random	436	80	18.3
Negative	140	26	18.6
Traumatic	116	16	13.8
	2,866	488	17.0
Jewish	134	1	0.7
Totals	3,000	489	16.3

ber of diaphragms, has an incidence of 13.8 per cent, a somewhat lower incidence than the other series. However, since positive findings fluctuate considerably from time to time in small samplings, there is reason to believe that this series will eventually show a percentage of positives close to the figure of the base series. If the Jewish series with a remarkably low incidence

of 0.7 per cent is omitted, it is noted that 17.0 per cent of the remaining diaphragms were positive for trichinae.

Our findings are in quite general accord with the summarized findings of trichina surveys conducted in various parts of the United States by other investigators. These findings are given in Table II.

In each of these surveys, with the single exception of that of Sawitz, only one method of examination was employed. Nolan and Bozicevich² have pointed out on the basis of our findings that either the microscopic method or the digestion-Baermann method used alone will detect only 66 $\frac{2}{3}$ per cent of the positive cases. If we apply a correction figure of 33 $\frac{1}{3}$ per cent to the total positives given in Table II, less Sawitz's cases, we have 594 positives, instead of 446 positives, in 3,294 diaphragms, or an incidence of 18.0

TABLE II

Findings of Trichinae in Post-mortem Surveys in the United States

Author	Date	Place	Number of Examinations	Number Positive	Per cent Positive	Method
Whelpley	1891	St. Louis, Mo.	20	1	5.0	Microscopic
Thornbury	1897	Buffalo, N. Y.	21	3	14.28	do
Williams	1901	do	362	21	5.8	do
		Philadelphia, Pa.	7	0	0.00	do
		Baltimore, Md.	126	5	3.96	do
		Denver, Colo.	10	1	10.00	do
Queen	1931	Rochester, N. Y.	344	59	17.2	Digestion
		Boston, Mass.	58	16	27.6	do
	1937*	Denver, Colo.	431	70	16.2	do
Riley and Scheifley	1934	Minneapolis, Minn.	117	20	17.09	Microscopic
Hinman	1936	New Orleans, La.	200	7	3.5	Digestion
McNaught and Anderson	1936	San Francisco, Cal.	200	48	24.0	do
Magath	1937	Rochester, Minn.	220	17	7.7	Microscopic
Sawitz	1937	New Orleans, La.	200	10	5.0	Microscopic and Digestion
Pote	1937	St. Louis, Mo.	1,060	163	15.37	Sections
Scheifley	1938	Minneapolis and St. Paul, Minn.	118	15	12.7	Microscopic
Totals			3,494	456	13.1	

* Reported by Scheifley, 1938.

per cent. While there are several variables in the data given in Table II, such as differences in method, amount of material examined, and changing factors over the period of time represented, it is striking that the corrected incidence figure is in such close agreement with the incidence figure in our series.

The number of larvae per gram of diaphragm material has been recorded in connection with all of our examinations and Table III gives a summary of these findings. The great majority of the positive cases represented infestations with less than 11 larvae per gm. However, 2.5 per cent of the cases had infestations varying between 101 and 1,000 larvae per gm. Unfortunately, we do not know the degree of trichina infestation, as expressed in terms of larvae per gm. of muscle, which will result in clinical symptoms of trichinosis, and it is therefore difficult to translate our findings into terms of cases of the disease. Ferenbaugh, Segal, and Schulze³ found only 8 larvae per gm. of gastrocnemius muscle obtained on biopsy from an individual suffering from clinical trichinosis. However, it is doubtful whether an infestation of this degree would be sufficient to produce clinical symptoms of disease in all cases. Furthermore, we have little reliable data as to the relative extent of trichina invasion of various muscles. If 0.4 per cent of our present population is infested with 101 to 1,000 larvae

per gm., there would be several hundred thousand individuals who would have been ill at some time or other with clinical trichinosis. Obviously, this figure represents the roughest sort of estimate and can have no validity until we are in possession of a great many more data. However, the figure would seem to indicate the occurrence of recognizable cases of trichinosis vastly in excess of the 5,000 to 6,000 reported during the past 95 years.

INCIDENCE IN POPULATION GROUPS

In connection with our diaphragm studies, we obtained information concerning the sex, age, race, occupation, and social-economic status of each individual represented. These data are designed to provide information concerning trichina infestation in different population groups and to determine the validity of our incidence figure as applied to the general population. Table IV presents these data for 2,000 cases in our base series.

In order to arrive at a rational interpretation of the data in this table, we should first examine statistically the validity of our incidence figure of 17.1 per cent for these 2,000 cases. The standard deviation of our percentage of positive cases, as computed by the formula

$$\sqrt{\frac{pq}{n}}$$

TABLE III

Trichina Larvae per Gram Found in 489 Infected Diaphragms of 3,000 Diaphragms Examined

Group No.	Larvae per Gram	Number of Cases	Per cent of Cases
1	Less than 1	177	36.2
2	1 to 10	246	50.3
3	11 to 50	47	9.6
4	51 to 100	7	1.4
5	101 to 500	9	1.9
6	501 to 1,000	3	0.6
7	Over 1,000	0	0
Totals		489	100.0

where p is the percentage of positive cases, q the percentage of negative cases, and n the total number of cases examined is ± 0.84 . Thus, on repeated samples of 2,000 each of the type of material here sampled, we might expect a range of variation due to chance as high as 18.8 per cent and as low as

15.4 per cent, this range being the range of 2 standard deviations above or below the mean of the sample.

An examination of Table IV indicates that there is apparently no special correlation between trichina infestation and most of the population groups represented. The incidence figure for the

TABLE IV

*Incidence of Trichinae in Various Groups as Found in 2,000 Post-mortem Examinations—
Base Series Nos. 1 to 2,000, Inclusive*

Group	Total Number in Group	Number Infested	Per cent Infested
Males	1,487	255	17.1
White	1,011	178	17.6
Colored	464	76	16.4
North American Indians	6	1	....
Chinese	2	0	....
Filipinos	3	0	....
Race unknown	1	0	....
Females	510	85	16.7
White	188	27	14.4
Colored	319	57	17.9
North American Indians	2	0	....
Mexican	1	1	....
Sex unknown	3	1	....
Whites	1,199	205	17.1
Negroes	783	133	17.0
Other races	14	2	....
Race unknown	4	1	....
Military (Army-Navy)	226 *	34	15.0
Officers (commissioned and warrant)	86	17	19.8
Enlisted men	140 *	17	12.1
Army	139 †	22	15.8
Navy	88 †	12	13.6
Families and relatives of military men	40	9	22.5
Civil	1,770	306	17.3
Civilian Conservation Corps	35 ‡	2	5.7
Farmers	22	2	9.1
Veterans, mostly World War	535 ‡	105	19.6
Military-Civil status unknown	4	1	....
Sea (Navy-Merchant Marine)	182	29	15.9
Merchant Marine	97	17	17.5
Land	1,818	312	17.2
Mentally deranged under hospitalization	385	65	16.9
Mentally sound or not under hospitalization	1,615	276	17.1
High economic-social status	445	79	17.8
Low economic-social status	1,456	251	17.2
Status unknown	99	11	11.1
Total cases	2,000	341	17.1

* One case, both soldier and sailor, counted only once

† One case, both soldier and sailor, counted in both groups

‡ Two cases, both CCC and veteran, counted in both groups

TABLE V

Incidence and State of Trichinae by Age at Death

Age at Death	Total Number of Cases	Positive				State of Trichinae		
		No.	Per cent	Per cent		Live	Mixed	Dead
				0-50	51-100			
0- 10	63	1	1.6	15.8		1	0	0
11- 20	47	2	4.3			2	0	0
21- 30	168	22	13.1			13	4	5
31- 40	280	45	16.1			23	9	13
41- 50	541	104	19.2			38	21	45
51- 60	327	52	15.9	18.7		21	4	27
61- 70	353	70	19.8			20	7	43
71- 80	146	33	22.6			7	4	22
81- 90	54	9	16.7			1	1	7
91-100	7	2	28.6			1	0	1
Unknown	14	1	7.1			1	0	0
Totals	2,000	341	17.1			128	50	163

following groups falls within the range of percentage variation possible by chance alone: white males, colored males, all males, colored females, all females, whites and negroes, Army personnel, civilians, occupation by land or sea, mentally deranged under hospitalization, mentally sound or not under hospitalization, high social-economic status and low social-economic status.

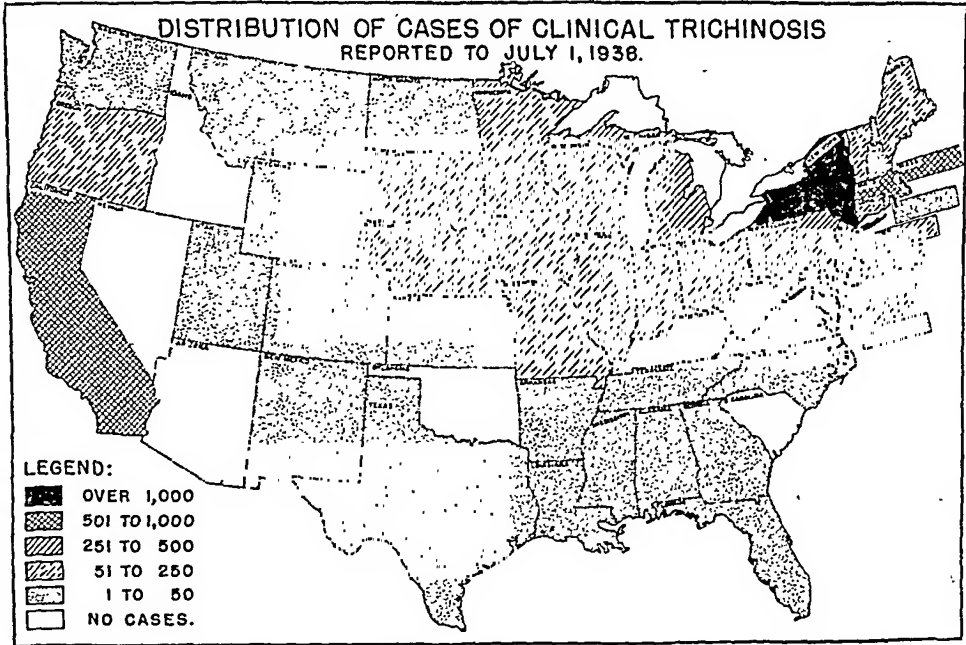
White females with 14.4 per cent infested are somewhat below the chance variation. However, the group is still rather inadequately represented and additional cases may bring the incidence figure more in line with the general incidence. The percentage of positives in the military group is slightly below the range of chance variation and a high incidence in commissioned officers is more than overbalanced by a low incidence in enlisted men and Navy personnel, the latter represented as yet by a relatively few cases. The percentage of positives in the veterans' group, consisting mostly of World War veterans, is 19.6, a figure higher than the 2 standard deviations from the mean percentage. However,

this group is made up of individuals with ages falling predominately within the decade 41 to 50. As the percentage of positives for this general age group is 19.2 (Table V), it would appear there is no particular correlation between past military service and trichina infestation.

There is one correlation which has not been computed from our data, but which is evident from information furnished by reported cases of trichinosis. There appears to be a very definite correlation between certain geographical areas and trichina infestation. Figure I shows the distribution of cases of clinical trichinosis reported up to July 1, 1938. The heaviest incidence areas lie along the North Atlantic seaboard and along the Pacific coast, areas in which the feeding of uncooked garbage to swine is extensively carried on.

Table V gives the incidence and state of trichinae by age at death for 2,000 cases in the base series. While the number of positive cases in the first two and the last decade is entirely too low to establish a sequence, in general there is a rise in the incidence of trichina infestation with increase in age.

FIGURE I



Such a sequence would be expected if we assume that long life offers greater opportunities for acquiring infestation. However, the decade 51 to 60, with 327 cases represented, shows an incidence of only 15.9 per cent, an incidence lower than that of the two previous decades. Furthermore, although the group incidence in ages 51 to 100 is higher than that in the age groups 0 to 50, both of the incidence figures fall within the range of chance variation of the series incidence. At this time, correlations between age and trichina infestation are not convincing and a larger series of cases must be awaited for support of the theory that individuals in later life should be more frequently infested with trichinae.

Considering the state of trichinae at age of death, infestations with mixed live and dead trichinae and with dead trichinae appear first in the decade 21 to 30, and in general the percentage of dead trichinae increases with increase in age. Such a trend might well be expected since relatively long life would permit of death and calcification of trichinae acquired in earlier decades.

SOURCES OF INFESTATION IN HUMAN TRICHINOSIS

With the exception of a small number of cases due to the consumption of bear meat, human trichinosis rests entirely on the basis of swine trichinosis. It is pertinent, therefore, to inquire into the source of infection in swine.

During the past 50 years or more considerable data have been accumulated concerning the prevalence of trichinae in swine fed on different types of feed. These data have been adequately summarized by Hall⁴ and need not be repeated in detail here. They may be expressed briefly as shown in Figure II.

Swine fed on cooked garbage and southern swine raised generally in fields and woods and without easy access to garbage or kitchen scraps rank in the lowest order of importance as sources of human trichinosis. Only about 0.5 per cent of these swine have been found to harbor trichinae.

Next in the order of importance are so-called grain-fed swine, as represented largely by swine from the Central West, of which 1.0 to 1.5 per cent have been

found infested with trichinae. If we exclude the rat as a major factor in the causation of swine trichinosis, it is apparent that these so-called grain-fed swine have not been raised exclusively on grain or on pasture crops but that many of them have received some garbage, probably in the form of scraps or swill from the farm kitchen.

Swine fed on uncooked garbage rank next in the order of importance as a source of human trichinosis and probably today represent the chief source of the disease in man. Since 4.5 to 5.0 per cent of these swine are infested with trichinae, they are approximately 10 times more important as a source of trichinosis than are southern swine and swine fed on cooked garbage.

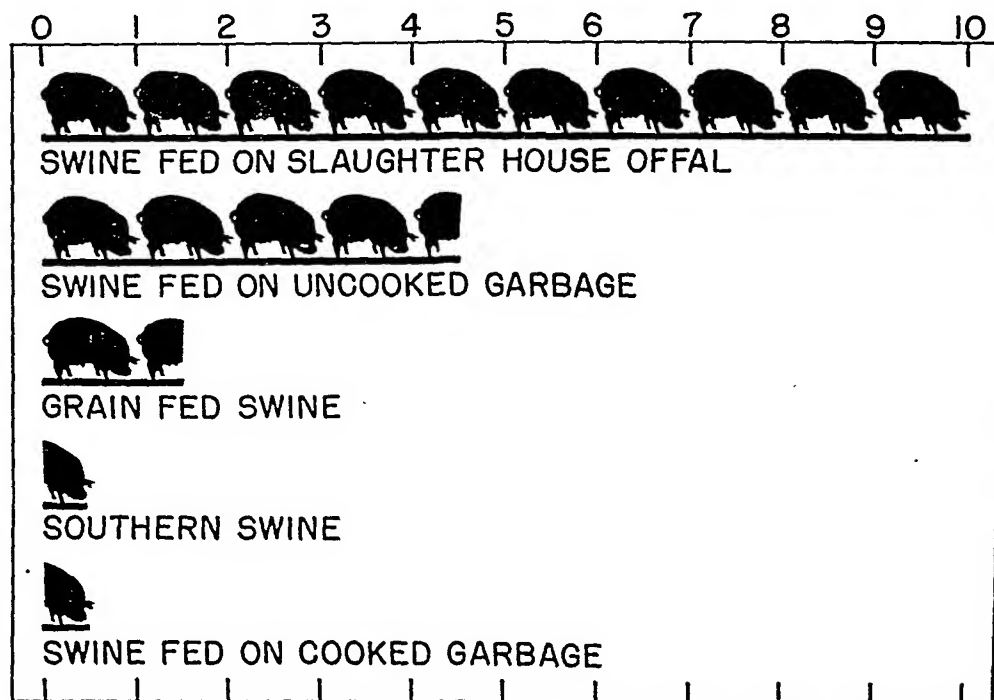
Evidence indicates that swine fed on slaughter-house offal are very frequently infested with trichinae, since

these swine show incidences of trichinae of 10 to 20 per cent. However, the practice of feeding offal to swine has been largely discontinued and this discontinuance, merely as a result of general improvements in sanitation, represents one of the few advances made in the control of swine trichinosis in this country since the disease was first recognized.

It is my opinion that the rôle of the rat as a source of swine trichinosis has been largely over-emphasized. Evidence for such emphasis seems to be based chiefly on the examination for trichinae of rats killed or captured around garbage feeding plants. While it is true that such rats have been found to be frequently infested with trichinae, and that swine do eat rats occasionally, and do occasionally eat carcasses of other swine, such occur-

FIGURE II

RELATIVE IMPORTANCE OF DIFFERENT TYPES OF SWINE AS SOURCE OF HUMAN TRICHINOSIS



rences are not sufficiently frequent to account for the relatively high incidences of trichinae in garbage-fed hogs. If the rat were a major factor in the causation of swine trichinosis one would expect to find as great a prevalence of trichinae in swine fed on cooked garbage as in those fed on uncooked garbage, since there is no reason to believe that rats are less prevalent around plants feeding cooked garbage than around plants feeding uncooked garbage. Garbage is usually handled so carelessly around hog feeding plants that in most places rats would have easy access to uncooked garbage even though the hogs might receive only cooked garbage.

THE PROBLEM OF CONTROL

Today in the United States only two measures are being employed generally to prevent human trichinosis and neither of these methods is aimed at the prevention of swine trichinosis, which we have seen is the source of nearly all cases of human trichinosis. One of these consists in efforts to warn the public by press releases, pamphlet distribution, radio programs, etc., to cook pork well. While such efforts are well intended, and should be continued, they apparently accomplish little since during the past half century there has been no apparent decline in the incidence of trichina infestation in man and no decline in the number of reported cases of clinical trichinosis.

The second control measure is represented by that portion of the meat inspection regulations of the federal Bureau of Animal Industry requiring the freezing for 20 days at 5°F., the heating at 137°F., or the smoking or curing, or both, of pork products customarily eaten without cooking by the consumer. Such products are mainly of the variety of so-called summer sausages. These regulations are adequately enforced, and are adequate

safeguards against the contraction of trichinosis from such of these products as are federally inspected. However, since only approximately two-thirds of the meat consumed in the United States is federally inspected, this measure does not represent a general measure of protection against trichinosis.

Other than the measures now being used to combat trichinosis, the following procedures are open to us:

The microscopic inspection of pork for trichinae might be carried out as it is in Germany and some other European countries. However valuable this measure may be in reducing the number of cases of trichinosis over a period of years, it is an expensive procedure and one not geared to the high speed operation of American packing plants. The cost of carrying on microscopic inspection of all swine slaughtered in federally inspected plants would no doubt exceed the present costs of the federal meat inspection service.

The refrigeration of all pork at 5°F. for 20 days in order to kill trichinae would no doubt result in a fairly adequate sort of control. However, such a procedure would require greatly increased facilities for refrigeration and would no doubt add considerably to the cost of pork to the consumer.

The feasibility of using the intradermal or some other antigenic test for detecting trichinous swine immediately before slaughter is being investigated, with the idea that the refrigeration of such pork to kill trichinae would not constitute a prohibitive expense. Even if such a test were infallible, its application could be enforced only in federally inspected plants, thus leaving about one-third of our meat supply unchecked for trichinae.

In contradistinction to the costly or inchoate methods mentioned above, we still have immediately available an entirely feasible and practical plan for the control of trichinosis. Since the

hog fed on uncooked garbage is today the major source of human trichinosis, the most logical approach to the problem seems to consist in the control of garbage feeding. However, before any restrictions are placed on garbage feeding, those engaged in the practice should be given the opportunity of voluntarily instituting effective measures for the prevention of swine trichinosis. In the case of those who do not choose to coöperate voluntarily, other steps should be taken.

The situation calls for local and state laws and regulations providing for the licensing of garbage feeding plants, for the cooking of garbage for a period of time sufficient to destroy all trichinae, and for the supervision of such plants by the proper agency. Licenses should be granted to such existing plants as represent a considerable monetary investment but should be refused for new ventures and for small scale garbage feeders who have little financial stake involved and would suffer little or no financial loss if forced to discontinue the practice.

This is a bare outline of the first step which can be taken under existing conditions toward the control of trichinosis. Details can be worked out to meet local conditions. In some states, existing laws and regulations may provide sufficient authority for a program of action; in other states, it may be necessary to ask for suitable legislation.

In conclusion, it may be pointed out that such a program for trichinosis control will not approach efficiency unless some steps are taken by local health officials to clean up their own backyards. There is no doubt that many American municipalities are contributing directly to the spread of trichinosis through sanction of the practice of feeding uncooked municipal garbage to swine maintained either on farms operated by the municipality or on farms operated by private contractors.

While it is difficult to obtain up-to-date information on the extent of this practice, the *Municipal Index* for 1930⁵ gives data on garbage collection and disposal in 557 cities of over 4,500 population, of which 216, or 38.8 per cent, disposed of their garbage by feeding it to swine. Eddy⁶ has recently stated that this method is the one practised in the greatest number of cases, and Toquet⁷ has estimated that 50 per cent of cities with a population over 15,000 utilize the hog-feeding method of garbage disposal. Gillespie and Reinke⁸ reported that in 1930, 162 of 242 cities in California were disposing of garbage by feeding it to swine. In this connection it will be remembered that of all states, California ranks second in the number of reported cases of trichinosis.

As much of the pork fed on municipal garbage is slaughtered locally, swine maintained on uncooked city garbage are an important source of trichinosis within the municipality.

REFERENCES

1. Hall, Maurice C., and Collins, Benjamin J. Studies on trichinosis. I. The incidence of trichinosis as indicated by post-mortem examination of 300 diaphragms. *Pub. Health Rep.*, 52, 16:468-490 (Apr. 16), 1937.
2. Nolan, M. O., and Bozicevich, John. Studies on trichinosis. V. The incidence of trichinosis as indicated by post-mortem examinations of 1,000 diaphragms. *Pub. Health Rep.*, 53, 17:652-673 (Apr. 29), 1938.
3. Ferenbaugh, Thomas L., Segal, Leo, and Schulze, H. A. A trichinosis epidemic of sixty-four cases. *J. A. M. A.*, 110, 1434-1436 (Apr. 30), 1938.
4. Hall, Maurice C. Studies on trichinosis. VII. The past and present status of trichinosis in the United States, and the indicated control measures. *Pub. Health Rep.*, 53, 33:1472-1486 (Aug. 19), 1938.
5. *Municipal Index*, 7th Ed., Section 11:617-635. American City Mag. Corp., New York, 1930.
6. Eddy, Harrison P., Jr. Refuse Disposal—A Review. *Munic. San.*, 8, 1:77-78; 81; 86 (Jan.), 1937.
7. Toquet, Frederick E. A comparison of methods for garbage disposal without odor nuisance, from the viewpoint of a municipal engineer. *Municipal Index*, 10th Ed., 349-354. American City Mag. Corp., New York, 1933.
8. Gillespie, C. G., and Reinke, E. A. Municipal refuse problems and procedures. *Weekly Bull.*, California State Dept. Pub. Health, 8, 39: 40: 153-155; 157-159 (Oct. 27, Nov. 3), 1934.

Milestones of the Past Fifteen Years in Public Health Nursing*

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1923! Let me set the stage for the birth of the Public Health Nursing Section of the American Public Health Association whose fifteenth birthday we are celebrating.

It was the time of the "Health Fairy," of "Cho-cho" the health clown—the brain-child of the Child Health Organization; of tonsil clinics in rural areas where wholesale tonsillectomies were performed in schools, homes, and churches; of "open-window" school rooms; of courses in tuberculosis nursing and "specialized" tuberculosis nurses; of arguments for "generalization" as against "specialization"; of a high infant and maternal death rate being valiantly challenged by funds provided by the Sheppard-Towner Act. We find in a magazine the last picture of a horse carrying a public health nurse in a "buggy" on her country rounds and read that the occasion of the picture is one for lament as the Nursing Committee is selling the mare to buy a Ford—with tears on the part of all (maybe not the mare). The last stories of post-war work in France and Italy were being published; three university schools of nursing had been established at Minnesota, Yale, and Western Reserve. It

was the time of demonstrations: the Commonwealth Fund, the Milbank Memorial Fund, the Metropolitan Life Insurance Company. We note with sympathetic understanding an address at an A.P.H.A. meeting by a forward-looking health officer who demands: "After the Demonstration—What?"

The American Child Hygiene Association and the Child Health Organization combined in this year to become the American Child Health Association to lead an honorable life until the close of 1935. Councils of social agencies were creeping over the land and state laws of public health nursing were being reviewed and modernized. There were 35 states with state supervising nurses in their departments of maternity and infancy—thanks to the ways and means provided by the Sheppard-Towner Act.

In this year—1923—the American Public Health Association met in Boston, and the Public Health Nursing Section received its christening from the Governing Council of the A.P.H.A. Of its birth Margaret K. Stack,¹ then doing public health nursing in Connecticut, writes:

The reasons for this decision (to recognize the Section) on the part of the Governing Board of the American Public Health Association are due, we believe, first, to the good prenatal care the Section received in advice and help from the Board and various members who urged the development of such a

* Read before the Public Health Nursing Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 25, 1938.

Section, second, to the earnest desire on the part of the Section itself to be so well born that it would be of real help to the parent body.

There is some misunderstanding in the minds of both health officials and public health nursing regarding many points that have to do with the development of a public health nursing service. In some instances this is due to lack of knowledge on the nurse's part of the problems in administration of which the health officer may not approve but which he cannot change, and in some instances is due to the fact that the health official does not always realize that the public health nursing group has a contribution to give other than the actual nursing service it renders. It seems logical, therefore, that the American Public Health Association, which includes among its members a large number of health officers, both state and local, should be the clearing house for discussion of all such problems.

Lest there be a thought in the mind of anyone that the Nursing Section in this Association means building up another nursing organization, banish the thought. The only reason for a "Nursing Section" of this Association is because in no other organization of which we know is the opportunity given for the health officers and the public health nurses to meet as members and coworkers, and by fair and free discussion arrive at decisions that will be of help to all.

When it was a year old, the Public Health Nursing Section listed 125 members at its first formal meeting. It is quite significant, I think, that one of the first papers presented to this Section was on the relation of the public health nurse to the practising physician.

Moving on to 1924, we find the Delano Red Cross nurses starting their work in rural areas. We find from the N.O.P.H.N. Census of that year that there were 11,171 public health nurses in the United States. In that year, standard report forms were published; the administration of insulin, discovered in 1922, was becoming a problem to the visiting nurse services. The question of amalgamation of public health nursing services in a given community was being widely discussed. Community chests were gaining in popularity.

By 1925, the Public Health Nursing Section was trying out, for the first time, joint sessions with other A.P.H.A. Sections and with considerable success, judging by the attendance. The first joint session was held with the Health Officers Section. Lest we think the subjects we now discuss are fresh and new, let me record two of the subjects discussed 13 years ago: "The division of responsibility between the public and private agency"; "How far is nursing care the responsibility of public health nurses in the health departments?" On the former point, I note that Dr. Lee K. Frankel brought a round of applause by his cryptic remark that he "hoped for a measure of respect between the health department and the private agency!"

In the general field in 1925 we find all child health problems very much to the fore. Plans for the White House Conference had started. Child labor conditions were rousing the nation to action. In this year the John Hancock Mutual Life Insurance Company established its nursing service. In the foreign field, a public health nursing committee had been appointed by the International Council of Nurses.

Mental hygiene and social hygiene programs in connection with nursing services were becoming the fashion of the day. At this time the first minimum qualifications for appointment of public health nurses were published by the N.O.P.H.N. and a survey of 17 plants where industrial nursing was being carried on was undertaken and published. The N.O.P.H.N. made its salary study an annual routine. The problem of Civil Service appointments occupied the thought of both health officers and public health nurses in our Section meetings, and the problem of generalized and specialized services was still with us. In this connection, a note from Miss Fox's report of a conference at the Children's Bureau has a familiar ring.

She writes: "That the Children's Bureau is appointing a committee to consider nursing reports from the field because of the difficulty the Bureau has had in giving acceptable accounting of the Maternity and Infancy work done by nurses in generalized services." The committee consisted of two state directors of public health nursing, representatives of the Red Cross, a nurse with county experience, and Children's Bureau representatives.

In this year also it is rather surprising to find, for those of us who were not following federal activities closely, that the need for more effective coördination among the departments in government was being considered. I quote from an article² in the *Public Health Nurse*:

The need for the more effective coördination of these scattered branches of the government which are concerned with public health is apparent. Duplication of effort, to be sure, is not as great as might be expected, but there is some, and there would be much more efficacious operation if there were a central federal organization in the health field. During the last twenty years or more, a national department of health has been recommended, and several notable, but unsuccessful, attempts have been made to secure such a department or bureau. There once was, in fact, a National Board of Health, established by Congress in 1879 for a four-year period. Its activities were restricted in 1882, it received no appropriations after 1885, and the law creating it was repealed in 1893. The Sixty-eighth Congress, which adjourned last March [1925] had before it a plan for a new Department of Education and Relief, regarding which fortunately no action was taken, as the scheme was defective for many reasons. Whether a new department of health should be advocated at this time is a question of political expediency, but certainly there should be a correlated health service, at least under an assistant secretary or a commissioner.

... It is to be hoped that a practical plan for correlation of federal health activities will be produced shortly and that when it is and has been decided upon by the medical, sanitary, and nursing professions, and by experts in political science, Congress may be induced to act favorably upon it. Congress should,

therefore, be rather positively informed that they do.

We might claim I think that in 1938 Congress *was* "rather positively informed that they do."

1926. For some reason for which I am not bright enough to find a predisposing cause, 1926 was a momentous year in public health and nursing work. We had the Goldmark Report on Nursing Education; the Frontier Nursing Service (1925) got under way; the Grading Committee started; Joint Vocational Service began as an independent vocational placement and guidance bureau; the Harmon Association for the Advancement of Nursing inaugurated its annuity plan for nurses; the first cost studies for public health nursing were published; Dr. Ferrell studied and reported on 298 full-time county health units (a jump from 4 in 1911). We find the first *Journal* articles discussing the distribution of the nurse's time, and time studies. We find in the Public Health Nursing Section of the A.P.H.A. a discussion of reasons for the health department carrying on bedside nursing care, and, incidentally, one of the most interesting reasons I find to be the advantage of a closer relationship to the private physician, since "it gives an opportunity to make him understand and feel the importance of the health department work and show a new usefulness of the department to him." Regional conferences of state nursing supervisors were held in this year. And perhaps, as a most outstanding "Milestone," the National Health Congress was held at Atlantic City. All the national health agencies and many allied groups with health interests met in Atlantic City at that time. I find that we have recovered from that experience sufficiently to consider the possibility of a similar congress during the World's Fair in 1939!

1926 and 1927 were also agitated by the problem of advisory committees for public health agencies. At this time, the committee to study this question which had been appointed by the American Public Health Association and the National Organization for Public Health Nursing made its report, strongly urging the appointment of advisory committees which might preferably be called "Citizen's Committees" for local health department programs. Specific advantages were quoted for the existence of such committees: They maintained unbroken policies in spite of changing personnel; it was possible to free new appointments from political influence; the voluntary committee could demand higher standards; and finally be very influential in interpreting and winning support for the health department program among the citizens of a county or community. The N.O.P.H.N. seems to have been considerably exercised about this recommendation to the point of calling its Advisory Council together to endorse the committee's report and to urge the appointment of such groups. The Advisory Council also discussed at some length the relation of the public health nurse to the health officer and the N.O.P.H.N. was given a charge to develop such national relationships within the health field as would strengthen the hand of the public health nurse locally. I note that in this year the Maternity Center Association experimented in a rural delivery service in Tioga County, N. Y., with the help of Sheppard-Towner Funds. The first institute for board members was held in New Haven in the spring of 1927 which led to the eventual establishment of the Board and Committee Members' Section in the N.O.P.H.N. with a full-time secretary and the *Board Members' Manual*, published in 1930 and revised in 1937.

1927 saw the great Mississippi flood.

In 1928 the first appraisal form for public health nursing appeared. At this time, also, "Nurses, Patients and Pocketbooks" pointed out the oversupply of unqualified nurses being graduated from small schools of nursing. Hourly nursing was coming to be more or less familiar to the visiting nurse services and, internationally, we welcomed the appointment of a public health nurse to the Health Committee of the League of Nations.

Shall we pass lightly over 1929-1933? Or is it worth while to find out something of what happened in those years? Historians say that a true perspective can only be gained on a world event from a distance of 50 years, and we are looking at it within a 10 years period! However, there are certain outstanding points in this period whose imprint is left with us. It is well perhaps to summarize these.

The number of public health nurses increased. Work increased. In 1933, 1,882 unemployed nurses were put to work on part-time jobs, some of which became permanent. Salaries decreased, cuts in special services within agencies had to be made in many instances. Our relation to social work and relief was clarified. The federal government, stepping in to relieve the unemployment situation and supply medical and nursing care to the indigent who were on relief, recognized for all time the policy that medical care includes nursing care and agreed that public health nursing agencies supplying nursing care to those on relief should be paid on a "per visit" basis for such service, just as the doctors were being paid for their care to relief clients. There were many new types of positions opening at this time in federal and state health departments. The U. S. Public Health Service recognized the Minimum Standards for Appointment of Nurses in official positions recommended by the N.O.P.H.N. The

development of the state programs brought to the fore problems of the place of the nursing division in the department of health, and we find Dr. Arthur P. McCormack discussing this in one of the meetings of the Public Health Nursing Section. In 1929 a study of nurses in industry was carried on, and in 1930 a study of negro nursing. Qualifications for positions were published again in 1930 and 1935 and the objectives of public health nursing defined.

It is interesting to recall that in this time when so many unqualified nurses were being brought into the public health field, there were three basic requirements urged upon all communities employing this type of worker. You remember we said that the qualifications of the worker should be passed on by a professional committee before employment, that there should be qualified supervision of such workers, and that a period of introduction to the field should be given. The development of possible service from subsidiary workers and visiting housekeepers was and is still a matter of discussion.

The depression is reflected in some of the titles of topics discussed at the A.P.H.A. meetings. "Getting Public Health Nursing Needs Across to Appropriating Bodies," and "Fitting Public Health Nursing into the Budget." Other related subjects were: "The Use of the Layman," "A Study of Volunteer Workers," "Health Insurance Plans for Families," "The Development of Community Nursing Councils," the question of "Public Support to Private Agencies," and "The Purchase of Nursing Service from Private Agencies." The better coordination of all programs for economy's sake was in our minds during these years.

The N.O.P.H.N. Census in 1931 showed 15,915 public health nurses in the United States.

In 1931 Miss Nelson was engaged as Consultant to the U. S. Public Health Service—a period of study which led to her recommendation for the appointment of a public health nurse in the Research Division of the U. S. Public Health Service.

In general, other events were taking place: Nurses were being employed as hostesses on the air lines; certification of nurses in states was becoming more frequent. In 1933 the Birth and Death Registration Area was complete for the United States. The Public Health Nursing Section appointed in 1933 a committee to study nursing in state health departments. In 1933 also a report was submitted on "Public Health Nursing Throughout the World" from the International Council of Nurses.

Out of the depression we see other lines of interest leading to the future—the 5 day week, annuities for nurses, expansion in state supervisory work and county work, new routines for referral to clinics, the relationship of private agencies to the medical profession, and we see, through the President's own interest, a development in the work for crippled children.

In 1934 the "Survey of Public Health Nursing" brought clearly before us our shortcomings as teachers, and "Physical Defects—The Pathway to Correction" (a study among school children in New York City) revealed the gaps in the school nurse's program. Institutes were started to assist nurses in the field to supplement their knowledge and enrich the content of their visits. By this time the discussion of generalization versus specialization was dying out and generalization seemed to have come to stay.

By 1935 all of us were ready to see more vigorous leadership toward a national health program develop from Washington and in 1935 the Social Security Act was passed. In the U. S.

Public Health Service and the Children's Bureau qualified public health nurses began guiding the state nursing programs—with 10 regional supervisors to assist them. At this time also the National Health Survey was undertaken. At this date every state but one in the Union had a state supervising nurse in the state department of health. We became aware of a growing emphasis on bedside care of the sick and the hope that this care could be extended to the rural areas; pneumonia campaigns started and the orthopedic program got under way. The N.O.P.H.N. Orthopedic Council was established the following year.

In 1936 the A.P.H.A. reported 81 fellows and 456 active members in the Public Health Health Nursing Section. A committee was appointed that year to study the relation of official agencies to private programs and another committee to review possible projects for research. Of the Social Security Act, Miss McIver, holding the position of Senior Public Health Nursing Consultant in the U. S. Public Health Service writes:

The Social Security Act is not an emergency measure. It is designed for the purpose of developing a permanent program of social betterment. However, the appropriations authorized by the Act must be made by Congress on an annual basis. Whether Congress will continue to appropriate the funds authorized by the Social Security Act will depend in a large measure upon the results which are accomplished. Increased opportunities always mean increased responsibilities. Federal, state, and local health agencies which are responsible for the administration of this program must accept the challenge and show that they are capable of doing a good job. If all health workers—including health officers, engineers, nurses, and others—accept as a common objective *the development of a well rounded public health program*, and if all personnel are appointed on the basis of merit and not because of politics or personal favoritism, it will not be difficult to convince appropriating bodies that public health is both a social and economic necessity.³

In 1937 Miss Randall's study of personnel practices in official agencies was published ("Personnel Policies in Public Health Nursing"). Under Dr. Parran's leadership, the national syphilis program was well under way, and a conference on syphilis was held in Washington.

In 1937 the N.O.P.H.N. had its Silver Jubilee and a record membership. Noteworthy also was the first occasion on which the N.O.P.H.N. met officially with the A.P.H.A. at its New York City meeting.

I cannot go on to 1938 and a summary of this 15 year period without stopping a moment to record the loss of three leaders in the public health field whose passing crippled public health nursing. I have chosen only three since they were leaders in their particular line of activity. In 1925 we lost Anne Hervey Strong, R.N., in 1931, Dr. Lee K. Frankel, and in 1934, Dr. William H. Welch. These friends of public health nursing contributed far more than we realized at the time. Their names, I think, should be inscribed with honor on any record of the past 15 years.

1938, like 1923, 1926, and 1935, would appear to be a year in which a larger "Milestone" should be erected, for in January of this year the National Conference on the Better Care of Mothers and Babies was held in Washington, and the National Health Conference in July. The significance of the latter gathering only the future will reveal. We already know that the character of the gathering and the trend of its thinking and its influence on medical programs are without precedent.

During all these years we have seen an increase in the things which we desire most—the number of nurses, their standards for appointment, the quality of their service, the distribution of their

services. There are 23,271 public health nurses in the United States this year. We have seen our conception of the number of nurses needed by the country change from 1—2,500 to 1—1,800. We are on the verge of seeing a new coördination between the public and private agency of new plans for the prepayment of medical and nursing care. We have seen the Public Health Nursing Section grow from 125 members to 731 today—a strong consulting and consultant body closely related to the other Sections of the A.P.H.A. and ready to take its part in whatever activity of the Association touches public health nursing. We hope the Section will continue to serve as it was originally planned, as a “clearing house for all problems that concern the health officer and the public health nurse” for their mutual benefit and the ultimate benefit of the public whom we both serve.

What of the future? This was not in my assignment, but I am tempted to quote a statement from the report of the National Resources Committee published in May, 1938, which reads as follows:

Any advance in public health will depend upon the quality of scientific research, the efficiency of organization and administration of health services, and the adequacy of economic support of these services.

I can think of no better goal for the Public Health Nursing Section of the A.P.H.A. than to share through the A.P.H.A. in promoting these three essentials to the advancement of public health.

REFERENCES

1. Stack, Margaret K. Provisional Section Made Permanent. *Pub. Health Nurse*, XV, 12:608 (Dec.), 1923.
2. Fox, Elizabeth G., and Tobey, James A. Public Health in the Federal Government. *Pub. Health Nurse*, XVII, 6:306 (June), 1925.
3. McIver, Pearl. Developments under the U. S. Public Health Service. *Pub. Health Nurse*, Sept., 1936, p. 590.

Dextrose in the Food Industries and Its Health Status*

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DEXTROSE † or refined corn sugar is a relatively new sweetening and preserving agent in the food industries. It was not until 1922 that Newkirk^{15, 16} made possible the commercial manufacture of dextrose by his special crystallization process.

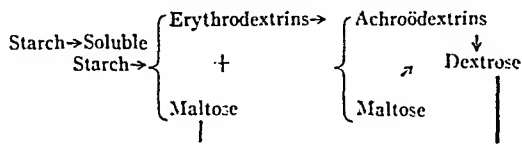
Refined dextrose is made by converting highly purified starch with hydrochloric acid. After the conversion, the excess acid is neutralized with sodium carbonate and the neutralized liquor is passed through centrifugal machines, filter presses, and bone char filters to remove all unconverted substances. The clarified liquor is concentrated in triple effect vacuum pans to 30° Bé and again passed over the bone char for further clarification and to remove any dissolved coloring matter. This liquor is then concentrated to

a heavy gravity in the finishing vacuum pan. The heavy gravity liquor is put in large cylindrical crystallizers, and slowly agitated for from 90 to 100 hours. During this agitation, crystallization takes place.

The heavy liquor, containing the crystals of pure dextrose, is run into centrifugal machines which separate the crystals from the liquor. The crystals are washed with pure water until nothing remains but the crystallized dextrose.

The crystals are then removed from the centrifugal basket and delivered to hot air rotary dryers where the excess moisture is removed. The sugar is then screened and is ready for packing.

The sugar made by the above process is 99.5 to 100 per-cent pure dextrose.



* Contribution 322 Massachusetts Agricultural Experiment Station, Amherst. Read before the Food and Nutrition Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 25, 1938.

† Also known as d-glucose, hydrated dextrose, dextrose hydrate, anhydrous dextrose and cerelese.

Until dextrose was accepted by the U. S. Pharmacopoeia, 10th revision in 1926, it was commonly known by the synonym "glucose." This confusion of names is unfortunate for the "glucose" of the Pharmacopoeia is corn syrup, a mixture of dextrin, maltose, dextrose and water and has quite different properties from refined crystalline dextrose.

As defined by the U. S. Food and Drug Administration in *Service and Regulatory Announcements*, 4th Revision, 1933: "Dextrose is the product chiefly made by the hydrolysis of starch or a starch containing substance, followed by processes of refining and crystallization. (When derived from cornstarch, dextrose is known commercially as refined corn sugar.) Hydrated dextrose contains not less than 90 per cent of dextrose and not more than 10 per cent of moisture, including water of crystallization. Anhydrous dextrose contains not less than 99.5 per cent dextrose and not more than 0.5 per cent of moisture."

Anhydrous dextrose is prepared by recrystallization of the hydrated dextrose, ground very fine and heated to 60°C. to remove the molecule of water of crystallization. This is the form of dextrose used for intravenous injections and in various pharmaceutical and medicinal preparations. Manufacturing details have been fully described by Krno,¹⁰ Cathcart,⁴ and Arnold.¹

The present annual production is increasing steadily year after year. Refined dextrose makes up only about 25 per cent of the total annual corn sugar

production of one billion pounds. The balance consists of confectioners' glucose, syrups, etc. The total sugar consumption per capita in our country is about 115 lb. Of this, 16 lb. is eaten as candy.

In truth, this is a staggering amount of sweets, when it is considered that in 1800 the per capita consumption was only about 10 lb. On the other hand, sugar is one of our most available and convenient and inexpensive sources of body energy, and scientific evidence has still to be adduced to show that any harmful effects result from the ingestion of large amounts of it.

The corn crop for 1938 is estimated by the U. S. Department of Agriculture at 2,260,000,000 bushels—a truly stupendous raw material source for dextrose manufacture. At the prevailing low cost of corn, dextrose can be manufactured to sell at considerably below the market price of sucrose. For these and other reasons we shall probably see in the future increased use of dextrose as food.

As yet dextrose makes up a relatively small part of the nation's sugar bowl; yet, with its increasing use as pure sugar and in foods and beverages, we may well inquire, both as public health officers and as consumers, into the nutritional and sanitary status of this food.

PROPERTIES OF DEXTROSE

Commercial dextrose is a fine, white crystalline product containing from 7 to 9 per cent water. Our analysis shows the following composition.

	<i>Regular dextrose hydrate per cent</i>	<i>Recrystallized dextrose hydrate per cent</i>
Moisture	7.75	8.00
Dextrose	91.40	91.80
Purity of dextrose solids	99.80	99.90
Ash	0.05	0.009
Iron	0.0001	0.0002
Chlorine	0.016	0.002
Sulfates (SO ₄)	0.008	0.008
Silica (SiO ₂)	0.0035	0.005
Calcium	0.0022	0.002

The high purity of dextrose is shown by this analysis. It corresponds to the purity of good quality cane or beet sugar. Because of the water of hydration in the dextrose molecule it is necessary to use 109.4 lb. of dextrose in order to supply the same sugar solids that are present in 100 lb. of sucrose. Dextrose is approximately 75 per cent as sweet as sucrose. According to one's point of view this lower degree of sweetness may be considered either an advantage or a disadvantage. The solubility of dextrose in water is somewhat less than that of sucrose, hence because of sugar crystal formation, jellies and preserves cannot be manufactured using only dextrose. Our laboratory⁶ as well as Van Arsdale and Eddy²³ have found that mixtures of dextrose and sucrose containing from 20 to 50 per cent dextrose are very satisfactory in the manufacture of most fruit products such as jams, preserves, jellies, and canned fruits. As shown by Berkeley and Hortley² dextrose solutions show considerably higher osmotic pressures than sucrose. That dextrose syrups do actually possess somewhat greater bactericidal action against yeast and bacteria than sucrose, is experimentally shown by Morrison.¹³

In crushed fruits and fountain syrups dextrose is now very extensively used in proportions of from 25 to 50 per cent of the total sugar.^{8, 17} The carbonated beverage industry uses up to 40 per cent of total sugars as dextrose in its syrup bases. This sugar, according to Buchanan,³ gives a more suitable body, reduces sweetness, and improves flavor. When dextrose replaces sucrose in carbonated beverages the added acid can be reduced by 10 to 15 per cent.

The Institute of American Meat Packers have found that reducing sugar (dextrose) prevents fading due to oxidation of the hemoglobin, and thus holds the red color. It is particularly efficacious in wet pickled meats, sau-

sages, and even in fresh and canned meats.

The extensive use of dextrose and various corn syrups in the baking industry hardly need be mentioned. As shown by Morison and Gerber,¹² dextrose and sucrose are interchangeable in yeast bread doughs and the loaf volume, flavor and sweetness are identical. The usual sugar percentage in bread formulae is now about 6.

Both dextrose and corn syrups are used in immense quantities in the manufacture of candies, sweet chocolate, marshmallows, and other confections. In dairy products, ice creams and sherbets may contain from 15 to 25 per cent of the total sugar as dextrose according to Tracy²²; and in condensed milks the use of dextrose is advantageous as reported by Hunziker.⁹

Results in our own laboratory^{6, 8} show that from 20 to 50 per cent dextrose can be used successfully in sweet pickles, relishes, and similar products. Other investigators have shown the feasibility of using dextrose in frozen or "cold pack" fruits in candied and glacéd fruits, in Maraschino cherries, licorice, wines, in fermented sauerkraut, dill pickles and olives. Considerable quantities are also used in pharmaceutical and medicinal products.

I need not enumerate more ways where dextrose can and is being used in foods and beverages. The fact remains that we are buying and eating large quantities of dextrose every day whether we know it or not. I think the industry is rather desirous that the public be informed about dextrose if one can believe the extensive advertising slogans seen everywhere in this country and in England.

LEGAL AND PUBLIC HEALTH ASPECTS

In 1930 the Secretary of Agriculture, Arthur M. Hyde, ruled that refined dextrose, as well as sucrose, could be used in the manufacture of food prod-

ucts without label declaration. Hence, the extensive use of dextrose in foods dates back only 8 years. While a few states still require the labelling of some manufactured foods containing dextrose, the wisdom of retaining such regulations seems questionable. Certainly no fraud is perpetrated and no nutritional or public health aspects are concerned. Dextrose and sucrose have practically equivalent purity and nutritive values. The former contains fewer microorganisms. Since corn is one of our staple agricultural crops and a surplus is often produced, it would seem to be in the public interest to extend rather than to restrict, the use of refined dextrose. In fact, it is doubtful that any state fully enforces its local regulations relative to the labelling of dextrose in all the products in which it is used—that is, candy, bread, ice cream, jams, preserves, pickles, condensed milk, meats, soda fountain syrups, canned foods, and carbonated beverages. In fact, there is no sound public health argument for doing so. The presence in a state of a competing sugar industry is not a sound reason for legislating against dextrose.

Nutritionally, dextrose and sucrose are equivalent. Excellent reviews on the physiology and biochemistry of sugars have been recently published by The Council on Foods of the American Medical Association,⁵ and by Pierce¹⁸ in the *Journal of Nutrition*. Dextrose is the normal sugar of the blood. When eaten, it is quickly absorbed as such and circulates unchanged in the blood stream. The work of Roberts¹⁹ indicates that dextrose is absorbed from the intestinal tract more rapidly than sucrose, though Murlin and Manly¹⁴ show that the absorption rates for the first 2 hours after ingestion are not significantly different. The studies of Schultz and Blish²⁰ on children showed that dextrose was the most efficient of the sugars studied for the alleviation

of the accumulation of lactic acid due to exercise. That the nature of the carbohydrate in the diet has relatively little effect on calcium and phosphorus retention in the body was reported by Speirs and Sherman.²¹ One of the more recent clinical (and possibly practical) uses for dextrose is suggested by the work of Haggard and Greenberg of Yale University.⁷ They found that the toxic effect of alcohol is influenced in inverse proportion to the amount of sugar in the blood. Thus, sugar will greatly decrease the pharmacological effect of alcohol, i.e., make it less intoxicating.

An excellent text called, "Dextrose Therapy in Everyday Practice" by E. Martin¹¹ reviews more than 2,000 articles on experimental and clinical studies on dextrose.

It is not the purpose of this short paper to show superiority of dextrose over other forms of carbohydrates, but merely to point out that a great mass of physiological evidence exists which proves that dextrose is certainly not inferior to other sugars in a nutritional sense. With refined carbohydrates now forming about 25 per cent of man's caloric intake we should take stock of refined dextrose, which within a very few years, has become a major component of so many of our everyday prepared foods.

Relative to the use of dextrose from a sanitary point of view, essentially no problems exist. The sugar is pure, clean, practically free from bacteria or other microorganisms, and contains no

toxic contaminants such as heavy metals, fluorine, selenium or arsenic.

It remains only to state that a careful review of the physical, chemical, and physiological properties of dextrose, its present use in the food industries, and its hygienic aspects lead to the conclusion that refined dextrose as marketed today in the United States presents no important public health problems.

REFERENCES

1. Arnold, L. *Chem. & Met. Eng.*, 33:347, 1926.
2. Berkeley, Earl of, and Hortley, E. J. *Trans. Roy. Soc. London* 206:481, 1906.
3. Buchanan, J. H. *Glass Packer*, 11:357, 1932.
4. Cathcart, W. R. *Am. Food J.*, 22:24, 1927.
5. Council on Foods, A. M. A. *J. A. M. A.*, 108:556, 1937.
6. Fellers, C. R., Miller, J. and Onsdorff, T. *Indust. & Eng. Chem.*, 29:946, 1937.
7. Haggard, H. W., and Greenberg, L. A. *Science*, 85:608, 1937.
8. Howard, H. A. Master's Thesis, Massachusetts State College 1938, 34 pp.
9. Hunziker, O. F. *Condensed Milk and Milk Powder*. 5th ed. La Grange, Ill., 1935, 696 pp.
10. Krno, J. *Food Indust.*, 6:106, 1934.
11. Martin, E. *Dextrose Therapy in Everyday Practice*. Paul B. Hoeber, Inc., 1937, 451 pp.
12. Morison, C. B., and Gerber, P. L. *Baking Tech.*, 5:334, 378, 1926; 6:11, 46, 1927.
13. Morrison, C. W. Master's Thesis, Massachusetts State College, 1938, 42 pp.
14. Murlin, W. R., and Manly, R. S. *J. Nutrition*, 12, 491, 1936.
15. Newkirk, W. B. U. S. Patents 1,471,347 (Oct. 23, 1923); 1,508,569 (Sept. 16, 1924); 1,521,830 (Jan. 6, 1925).
16. Newkirk, W. B. *Indust. & Eng. Chem.*, 16: 1173, 1924.
17. Newman, K. R. Master's Thesis. Massachusetts State College, 1937, 46 pp.
18. Pierce, H. B. *J. Nutrition*, 10:689, 1935.
19. Roberts, A. C. *Am. J. Physiol.*, 117:257, 1936.
20. Schultz, F. W., and Blish, E. *Am. J. Dis. Child.*, 53:960, 1937.
21. Speirs, M., and Sherman, H. C. *J. Nutrition*, 11:211, 1936.
22. Tracy, P. H. *Ice Cream Trade J.* 32, 2:30, 1936.
23. Van Arsdale, M. B. and Eddy, W. H. *Bur. Publ., Teachers College, Columbia Univ., New York*. 1933.

Preparation of Scarlet Fever Toxin^{*}

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THE publication by Rane and Wyman¹ of a flocculation test for scarlet fever toxin was of great potential value in the development and study of better scarlet fever antigens, just as Ramon's discovery of the flocculation test for diphtheria toxin facilitated the study of diphtheria toxin and toxoid. This paper is concerned with verification of this important work of Rane and Wyman, and with the use of the method, to guide the production of scarlet fever toxin of higher flocculating values. The flocculating test is especially advantageous in the study of scarlet fever toxins, since titration by the usual skin test method is time consuming and relatively inaccurate, unless many rabbits² or Dick positive human volunteers are used.

Until recently the production of potent scarlet fever toxin on beef or veal infusion broth or semi-synthetic media was none too successful, toxins with skin test doses of 200,000 to 300,000 per milliliter being considered very strong. O'Meara,³ however, was successful in producing toxins containing 1,000,000 to 5,000,000 skin test doses per ml. with a "straight line" digest of horse muscle containing 1 per cent peptone. One of the disadvantages of

this method is the use of horse muscle which makes the toxin unsuitable for human immunization.

The crude toxins prepared by Rane and Wyman¹ in their study of the flocculation reaction averaged 2-3 L_t units and 120,000 to 180,000 S.T.D. per ml. and were concentrated to obtain rapidly flocculating toxins. By modification of their methods we have, during the past year, produced crude toxins with L_t values as high as 26 units and with skin test doses as high as 1,000,000. Concentration of these toxins is therefore unnecessary and the L_t determinations are now made with the same ease and accuracy as in testing diphtheria toxin by the flocculation method.

Because of the potency of these toxins the methods of preparation are given in detail.

INFUSION MEDIUM

This medium is prepared by infusing 1 lb. of ground fat-free veal in 1 l. of distilled water for 12 to 18 hrs. at 5°C. The mixture is then boiled for 15 to 20 min., the meat strained out and pressed, and the liquid filtered through paper. Two per cent proteose peptone is added and the pH adjusted to 7.6 to 7.8 with sodium hydroxide. The broth is finally filtered through absorbent cotton and dispensed in 2 l. amounts in 3 l. Erlenmeyer flasks. It is sterilized by autoclaving at 120°C. for 20 min.

^{*} Read before the Laboratory Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

INFUSION FREE MEDIUM

The semi-synthetic medium is a modification of the Wadsworth and Wheeler formula⁴ for the preparation of diphtheria toxin and has the following composition:

Potassium phosphate C.P. K_2HPO_4	1.0 g.
Sodium phosphate C.P. $NaH_2PO_4 \cdot H_2O$	1.0 g.
Magnesium sulphate C.P. $MgSO_4 \cdot 7H_2O$	0.2 g.
Calcium chloride C.P. $CaCl_2$ anh.	0.1 g.
Peptone, Proteose, Difco	20.0 g.
Ammonium lactate, C.P.	4.5 g.
Succinic acid	2.0 g.
Distilled water	1,000.0 ml.

The peptone is dissolved in approximately 700 ml. of distilled water. Each of the salts is dissolved separately in a small quantity of water and added to the peptone solution in the order given. The volume is brought to exactly 1,000 ml., the pH adjusted to 8.0 with sodium hydroxide and the medium boiled for 3 to 5 min. It is filtered through paper, dispensed in 2 l. amounts in 3 l. Erlenmeyer flasks, and autoclaved at 120°C. for 20 min.

OTHER MEDIA

The dried complete medium described by Bunney and Thomas⁵ for production of diphtheria toxin can also be used for the preparation of scarlet fever toxin. We have obtained toxins containing 400,000 S.T.D. and 9 L_t units with this medium.

Although toxins have been prepared with the horse muscle digest medium described by O'Meara³ which contained 1,000,000 S.T.D. per ml., flocculation of these toxins with our antitoxins has thus far been unsuccessful.

CULTURE

Toxin is prepared from the Dochez No. 5 strain of hemolytic streptococcus. The culture is retained on blood agar, virulence being maintained by weekly passage through mice. Before a lot of toxin is prepared the strain is acclimated to that specific lot of broth by

several successive transfers in 5" by $\frac{5}{8}$ " culture tubes containing 6 ml. of the medium enriched by the addition of 0.1 per cent dextrose.

TOXIN PRODUCTION

The method of inoculation, incubation, adjusting of pH, and addition of 50 per cent dextrose solution for the infusion medium is similar to that described by Rane and Wyman.¹ Because growth is slower on the semi-synthetic medium the cultures are kept at 37.5°C. for the first 18 hrs. but otherwise the method is identical with that used for the infusion broth.

After the required quantity of dextrose has been added and purity tests are made, sufficient phenol is added to the pure cultures to make a concentration of 0.5 per cent. The toxin is then filtered and tested for potency.

TITRATION OF TOXIN

The S.T.D. of the toxins is determined by intradermal injection into rabbits, every 5th or 6th lot being tested on human volunteers.

In the flocculation test rapidly flocculating accurately standardized antitoxins containing 150 to 200 units are used, antitoxin being measured with the Trevan-O'Brien syringe. The technic is similar to that described by Rane and Wyman.¹ The S.T.D. and L_t value of the last 18 lots of toxin prepared within the past 18 months are given in Table I.

The speed of flocculation of the crude toxins varies with the L_t value, toxin No. 210 containing 20 units flocculates in 20 minutes at 45°C. and No. 206 containing 4 L_t units requires 10 to 12 hours at this temperature.

With the stronger toxins flocculation may appear in several tubes simultaneously. It is necessary to dilute these toxins to obtain accurate readings. This phenomenon was also observed by Rane and Wyman in the flocculation of their concentrated toxins.

TABLE I

A Comparison of the L_t Value and the S.T.D. of 18 Lots of Crude Scarlet Fever Toxin

Lot No.	Broth	S.T.D. per ml.	L_t per ml.
204	Infusion	500,000	6
205 A	"	1,000,000 *	26
B	"	1,000,000	16
206	"	1,000,000 *	4
207 B	"	500,000	14
208	Complete dried medium	400,000	9
209	Infusion	500,000	9
210	"	500,000	21
211	"	<300,000 *	8
212	"	1,000,000	7
213	"	1,000,000	14
214	"	"	24
215	"	1,000,000	20
216	"	300,000 *	8
217	"	1,000,000	4
218	Semi-synthetic	1,000,000	19
219	"	"	7
220	"	500,000 *	20

* Checked on human volunteers

DISCUSSION

The results in Table I indicate that there is very little correlation between the skin test dose and the L_t value of our crude toxins, particularly when prepared from the infusion medium. Toxins No. 205 A and 206, for example, had a skin test dose of 1,000,000 but the former toxin had an L_t value of 26 and the latter an L_t value of only 4. That these were the correct determinations and not nonspecific zonal flocculation values was verified by testing these toxins over a range of 2 to 60 units. The results with semi-synthetic media indicate that, with this medium, there may be a closer relationship between the S.T.D. and the L_t value. Rane and Wyman,¹ on the other hand, found a definite L_t -S.T.D. ratio, one L_t unit being equivalent to approximately 60,000 S.T.D. of toxin. Their results were based upon flocculation tests on toxins purified by ammonium sulphate but the concentrates were prepared from both infusion and infusion-free media.

Several toxins prepared from the horse muscle digest medium described by O'Meara³ which were particularly

strong when the toxicity was measured by the skin test reaction have, in our hands, been found entirely devoid of flocculating ability in the crude state. The author of this method also found these toxins to be lower in flocculating substance than toxins prepared by other procedures.

The L_t value from one flask to the next with a given lot of toxin prepared at the same time and in the same manner varies considerably. The approximate titer of 10 cultures comprising one lot of toxin is given in Table II.

TABLE II

The Variation in L_t value of 10 Cultures Comprising a Single Lot of Scarlet Fever Toxin

Flask No.	L_t per ml.
1	14
2	22
3	18
4	<10
5	<10
6	<10
7	18
8	<10
9	22
10	<10

The L_t values of the individual cultures of this lot vary from less than 10 to 22 units, and each lot of toxin given in Table I was therefore pooled from 10 to 12 individual cultures.

We are continuing this study with the view of finding a simpler method of preparing high potency toxin with the Dochez No. 5 strain. The recent report of Rane and Wyman⁶ describing the production of toxin containing 10 to 80 L_t units from the No. 594 strain of hemolytic streptococcus may be very important if this strain is found to have as wide a valency as the Dochez No. 5 strain.

It will remain to be shown whether there is any correlation between the L_t value and the antigenicity of scarlet fever toxin.

SUMMARY

The report of Rane and Wyman

showing that scarlet fever streptococcus toxin flocculates with antitoxin has been confirmed.

Methods for the preparation of crude scarlet fever toxin with hemolytic streptococcus, strain Dochez No. 5 and having L_t values of 4 to 26 units and skin test doses as high as 1,000,000 which flocculate directly are described.

NOTE: We wish to express our gratitude to W. E. Bunney for his valuable suggestions and support throughout this study and to J. T. Tripp for testing our toxins on human volunteers.

REFERENCES

1. Rane, L., and Wyman, L. *J. Immunol.*, 32:321, 1937.
2. Plummer, H. *J. Exper. Path.*, 15:80, 1934.
3. O'Meara, R. A. Q. *J. Exper. Path.*, 15:295, 1934.
4. Wadsworth, A. B., and Wheeler, M. W. *J. Infect. Dis.*, 55:123, 1934.
5. Bunney, W. E., and Thomas, L. E. *J. Immunol.*, 31:95, 1936.
6. Rane, L., and Wyman, L. *Proc. Soc. Exper. Biol. & Med.*, 36:690, 1937.

Results of Venereal Disease Control in Canada*

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THE venereal disease control movement in Canada began during the Great War. Previous to the war factors had begun to operate which were calculated ultimately to call the problem to public attention. The most potent of these was the discovery of the Wassermann reaction. The gradual application of this test, especially in institutions, revealed that syphilis was far more prevalent than anyone had suspected. One recalls that in pre-Wassermann days the relationship between such conditions as aortic aneurysm, general paralysis of the insane, and tabes dorsalis with syphilis were not considered to be invariable. With the development of the Wassermann technic the relationship was confirmed but in addition positive diagnosis was established in thousands of other cases and the discovery of additional thousands of cases of entirely unsuspected disease created a growing appreciation of the fact that in syphilis we had a problem of major public health importance. There was also a growing appreciation of the seriousness of gonorrhea as a major cause of disability. In 1913, a group of British physicians, headed by Sir William Osler, Regius Professor of Medicine at Oxford,

and Sir Clifford Albutt, Regius Professor at Cambridge, wrote a letter to a morning newspaper in London, England, calling attention to the need for governmental action. The result was the Sydenham Royal Commission appointed by the Asquith Government which sat for 3 years and brought in a startling report in April, 1916.

Evidence was presented to this Royal Commission to the effect that 10 per cent of persons living in cities in Great Britain were infected with syphilis, that there were 100,000 fresh infections of this disease a year, and that gonorrhea was much more prevalent than was syphilis. The two diseases were responsible for an enormous amount of disability, and the beds of hospitals, insane asylums, and institutions for the blind and defective were filled by thousands of their victims. The rôle of syphilis as a major cause of death was recognized.

While interest in the subject was rapidly growing war broke out. During previous wars scientific knowledge had not progressed enough to suggest particularly strenuous methods of control, but in the Great War venereal diseases were from the beginning treated as a serious problem. The routine Wassermann was not instituted as a means of keeping syphilitics out of the army, and many syphilitics became soldiers. Regular inspection resulted in the detection of many new

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cases of gonorrhea and syphilis in enlisted men. All cases when discovered were promptly isolated and treated. Venereal disease hospitals were erected, and in every army the segregation of thousands of venereal cases provided visible evidence that the prevalence of venereal disease seriously interfered with army efficiency.

It was also realized that all of these cases originated in the civil population and in order to prevent fresh infection methods were evolved to trace and treat civil cases. The use of the so-called social case sheet in connection with investigating the origin of infection in soldiers made it possible in the Province of Ontario to arrive at an estimate of the prevalence of the two diseases.

In 1916, a deputation from Toronto to the Canadian Conservation Commission submitted that 12.8 per cent of patients in the Toronto General Hospital showed a positive Wassermann reaction. The following year, 1917, routine Wassermann reactions in Montreal General Hospital showed that 26 per cent of the patients in that hospital were infected. The seriousness of the situation both in military and civil life resulted in the appointment of a Royal Commission on Venereal Diseases in Ontario, and in 1918 the Ontario Legislature passed the Ontario Act for the Prevention of Venereal Diseases. This legislation provided a standard type of legislation upon which legislation in most other provinces was based.

There has been much discussion of the results of the Scandinavian program and of Scandinavian legislation. Typical Canadian legislation included most of the characteristic features of the Scandinavian law. Legislation of nearly all of the provinces included a provision whereby the physician was required to report cases of venereal disease to the local health authority by number. Where the patient neglected treatment

the physician was instructed to report the case by name, whereupon the medical officer of health was empowered to give such direction for the treatment of the patient and, if necessary, for his detention, isolation, and prevention of infection from him, as he deemed necessary and as authorized by regulations which were subsequently drawn up. Persons under arrest or in custody could be examined by the medical officer of health and treatment carried out under his direction. Another important section of the typical venereal disease legislation provides that where the medical officer of health is credibly informed that any individual is infected with venereal disease and may infect others, steps may be taken to ascertain the condition of such person and institute treatment if necessary.

Hospitals are required to make effective provision for the examination and treatment of venereal disease. Persons other than legally qualified medical practitioners are forbidden to treat venereal disease. The advertising of venereal disease remedies is forbidden.

Under various venereal disease acts, of which the above provisions are typical, most of the Canadian provinces undertook to place venereal disease in a category similar to that in which other communicable diseases are placed. Venereal disease literature of a standard character was printed in most of the provinces in order that the personal education of the venereal disease patient might not be neglected. It was felt that the Canadian legislation was at least as adequate and far reaching as any other for the control of these sinister maladies.

Legislation, however, was not sufficient to control venereal diseases. It was necessary to provide clinics for the thousands of patients who were likely to apply for diagnosis and treatment, lacking the necessary funds to pay for it. In addition we had scarcely emerged

from the stage where it was considered highly improper to use the words gonorrhea or syphilis in public. Obviously people in general knew little or nothing about the signs or symptoms or seriousness of venereal diseases. Even if infected they were unlikely to realize the importance of prompt and efficient treatment. An educational campaign was necessary.

Partly because public opinion was aroused and to a degree because of the interest of a far-sighted member of the Dominion Cabinet, the Honourable N. W. Rowell, first Minister of Health for Canada and now Chief Justice of the Supreme Court of Ontario, a conference was called in Ottawa, May, 1919, for the discussion of a national venereal disease control program. All Provincial Chief Officers of Health, as well as representatives of many national organizations, were present.

There had been in the United States a fine wartime venereal disease control program. The Chamberlain-Kahn Bill had provided what seemed to be the beginning of a fine civil program. Secretary of War Baker kindly sent two army officers to the Canadian conference to describe the activities commencing in the United States—and largely because of the fact that the Chamberlain-Kahn Bill had provided for state subsidy in this field, at the Canadian conference the sum of \$200,000 annually was set aside out of Dominion funds for this purpose:

1. The maintenance of a Division of Venereal Diseases at Ottawa
2. The partial subsidy of a voluntary association to undertake public education
3. The making of grants to the various provinces in proportion to their population and on condition that each province spend in addition an amount equal to their Dominion grant.

This Dominion-wide scheme came into existence simultaneously with the

establishment of the Dominion Department of Health in 1920.

The subsidizing of a voluntary organization was an extremely important part of the plan. It was felt that in the absence of organized public opinion a change in the federal government might easily result in a Dominion administration unfriendly to Dominion participation in the scheme or that failure to keep the public fully informed as to the need for the continued appropriation of public funds for venereal disease control might result in an apathy which would destroy the scheme with equal effectiveness. Therefore it was resolved to make no mistake about insuring the continuance of organized public education. This was a definite part of the scheme which resulted in the machinery of the plan remaining intact for 11 years. The Canadian scheme came into effect to a degree as the result of the example set by the United States in their fine wartime plan and by the possibilities which seemed to be opened up by the Chamberlain-Kahn Bill. It preceded the present splendid coördinated plan in the United States by 15 years.

The expenditure on venereal disease control in Canada, with a population of 10,000,000, amounted to \$400,000 annually by the Dominion and the provinces alone for a number of years. The amount of Dominion grants for venereal disease control was later reduced and, in 1931, as the depression became acute and partly as a result of the depression, the Dominion grants were discontinued altogether. Later the grant to the voluntary association, now known as the Health League of Canada, an organization with a broad program of health education, including venereal disease, was restored in part and a grant of \$50,000 was made this year (1938) by the Dominion to pay for drugs used by the provinces in the treatment of venereal disease. It is

hoped that this action by the Dominion Government indicates the renewal of Dominion leadership in this field.

The assumption of Dominion leadership in Canada, in 1920, in the venereal disease control program, had immediate effects. The provinces stimulated by the financial support of the Dominion Government immediately commenced to organize special departments under specialist officers. Clinics rapidly sprung into existence in all of the provinces so that, while previous to the development of the Dominion-wide scheme there were a few scattered clinics and no co-ordinated action, soon all provinces were coöperating. Shortly there were a hundred clinics in operation and the number of treatments increased year by year. The machinery of clinic management including social follow-up methods progressively improved.

The voluntary association which from the beginning was an integral part of the scheme was for the first year of its existence called the National Council for Combating Venereal Disease. This organization took the lead in the necessary educational program. Chief officers of health for the province became executive members of the association and with prominent citizens, lay and medical, assisted in the public spreading of information on all phases of the subject. The utilization of a moving picture, "The End of the Road," a wartime film developed through the coöperation of the American Social Hygiene Association and the Young Women's Christian Association, shown to hundreds of thousands, was instrumental in attracting thousands of patients to the newly established clinics.

An arrangement with the distributing company whereby the words, "venereal disease," must be used in all advertising copy in all parts of Canada soon accustomed Canadian newspapers to the frank discussion of a subject which had previously been studiously avoided, in

both news and editorial columns. As a result of this early arrangement there has been for many years now little tendency on the part of Canadian newspapers to avoid the frank discussion of the Venereal Disease problem. In the second or third year of the scheme the voluntary association, by this time known as the Canadian Social Hygiene Council, was fortunate in procuring the services of Mrs. Emmeline Pankhurst, the famous leader of the Suffrage Movement in England. Mrs. Pankhurst, a great and sincere woman, for several years a member of the staff of the Canadian Social Hygiene Council, made a wonderful contribution to the cause. Campaigns were organized in which Dr. J. J. Heagerty, at that time Director of the Venereal Disease Division at Ottawa, Mrs. Pankhurst, the General Secretary of the voluntary association, and provincial health officers addressed great meetings in various parts of Canada. Campaigns instituted throughout the Dominion using these methods at this time were extraordinarily successful in enlisting public sympathy and support.

An unusual type of campaign was instituted in the Province of Quebec. In this province it was decided to depend almost entirely on a voluntary scheme. No very definite legislation was put on the Statute Books. Instead Dr. A. H. Desloges, Director of the Division of Venereal Diseases, instituted a unique method of obtaining public coöperation and developing his educational campaign. In the Province of Quebec we have a population composed largely of French-Canadians of the Roman Catholic faith. A direct appeal was made to the Church for co-operation in a great campaign of enlightenment. The response was prompt and striking. Meetings were arranged in all parts of the province presided over by priests, bishops, and even archbishops. Competent medical men lec-

tured, films were shown, and literature was distributed.

Organization of centers for free treatment was developed and trained physicians administered treatment.

I refer to this coöperation of the Roman Catholic Church in Quebec because I believe it to be unique in the history of organized educational methods for the control of this particular type of disease. Meanwhile work was carried on throughout the other provinces of Canada, all of which coöperated in the coördinated scheme under Dominion leadership.

The Canadian scheme had 3 essential factors:

1. Federal leadership resulting in coöperative action among the Dominion, the provinces, and municipalities.

2. A strong voluntary association to keep up a continuous educational program. This educational program not only educated the individual to seek treatment if infected, but it induced the tax payer to endorse the expenditure of public funds on venereal disease control.

3. Adequate legislation in all but one province.

This plan was continuous between 1920 and 1931. The withdrawal of federal grants in 1931 might well have been calculated to wreck the entire Canadian scheme. However, the passage of years had meant the stabilization of provincial efforts and the result was that although the provinces were compelled to carry on by themselves, and although in some cases budgets were reduced, still venereal disease control work continued throughout the whole of Canada.

The voluntary association lacked government subsidy in the lean period, yet managed to develop the moving picture, "Damaged Lives," which since 1933 has been shown in practically all English speaking countries as well as in some others. This year this picture is reported as showing for the first time in South Africa, Singapore and the

Straits Settlements, the Philippines, India, and China. As a result of the Canadian scheme we have records of the treatment of several hundred thousands in clinics, and although the reporting by physicians has been inadequate, unquestionably many other thousands have sought treatment from private physicians who otherwise would not have done so.

It is extremely difficult to appraise the results of a venereal disease control plan as statistics in this field are likely to be misleading. Surveys have been done by the Canadian Social Hygiene Council, now the Health League of Canada, in 3 cities—Toronto, Winnipeg, and Ottawa. The first surveys showed a lower incidence in Toronto and in Winnipeg than in 17 American cities surveyed at about the same time, in 1929. Subsequent surveys have brought out some extremely interesting results. The last two surveys done in 1937 were in Toronto and Ottawa. These surveys undertaken by a joint Committee of the Health League of Canada and the Academy of Medicine were carried on by writing circular letters to all practising physicians and to all clinics and all institutions in an attempt to ascertain the number of cases of gonorrhea and syphilis under treatment at one time. The Toronto survey and the Ottawa survey showed approximately the same percentage of venereal disease in the population. For example, the rate of incidence of the two diseases in Ottawa was 9.95 per 1,000 population as compared with 9.56 per 1,000 in Toronto. The total number of cases of syphilis and gonorrhea reported through the survey in Toronto, in May, 1937, showed 6,188 in an estimated population of 645,462. There were 3,639 cases of syphilis and 2,549 of gonorrhea, rates of 5.6 and 3.94 respectively per 1,000 population.

The first survey done in Toronto was in 1929 and since that time the actual

number of cases under treatment had increased, but there was a remarkable change in the type of case under treatment. In the 1929 survey there were 909 cases of "early" syphilis under treatment. In 1937 this number had been more than cut in half. There were 433 cases under treatment.

In 1929 there were 2,259 cases of "late" syphilis under treatment. In the 1937 survey this number had increased to 3,266. In other words there was an actual decrease in "early" cases under treatment of over 50 per cent, and an increase in the number of "late" cases under treatment of considerably over 50 per cent. It is a little difficult to understand what such statistics mean unless one considers them side by side with the records of the results of routine Wassermanns in institutions. Table I gives the record of syphilis in Toronto General Hospital, 1916-1935.

TABLE I

*Routine Wassermanns Positive in
Toronto General Hospital*

	<i>Per cent</i>		<i>Per cent</i>
1916.....	10.4	1926.....	4.5
1917.....	9.95	1927.....	3.8
1918.....	5.9	1928.....	3.5
1919.....	8.8	1929.....	3.2
1920.....	9.0	1930.....	3.4
1921.....	6.3	1931.....	2.7
1922.....	6.0	1932.....	2.5
1923.....	6.2	1933.....	2.5
1924.....	5.6	1934.....	1.7
1925.....	5.8	1935.....	1.5

In the same time in the nearby hospital for Sick Children the percentage of routine Wassermann tests which were positive fell from 5 per cent to less than 1 per cent. In St. Michael's Hospital, Toronto, the percentage of positives over the last 5 years has averaged 2.03 per cent. In Kingston General Hospital in Eastern Ontario the latest report is 1.3 per cent.

Considering these statistics with the statistics concerning the number of

early and late cases under treatment, one is forced to the conclusion that in the period under review there has been a marked fall in early syphilis. In addition, hospital statistics prove that there is much less late syphilis. In spite of this a greater number of cases of late syphilis are under treatment. One must conclude that the detection of late syphilis, particularly by means of the routine Wassermann reaction, has improved.

Dr. Parran¹ in discussing a paper by Dr. Einar Rietz, Commission of Health in Stockholm, Sweden, states that in the Rigs Hospital in Copenhagen, the Dean of the Medical Faculty and Professor of Obstetrics, said that among nearly 2,000 deliveries over 3 years the number of cases of syphilis as shown by routine Wassermann tests and careful histories, varies from 30 to 35 per year. A recent survey in the Lying-in Hospital of Toronto General Hospital showed that in 1,000 successive pregnancies the Wassermann was positive in but 3 cases. Apparently the Copenhagen rate was 1.7, the Toronto rate 0.3.

After every great war in history the late end results of syphilis have become more evident. The Canadian Department of Pensions and National Health stated that shortly after the war two reliable sources of information, one European and the other American, forecast that 2.5 to 4.5 per cent of syphilitics would have developed tabes or general paralysis of the insane in 20 years from the date of initial infection but that as a matter of fact only 0.5 per cent of known cases of syphilis in the Canadian Expeditionary Force have developed either of these serious nervous system sequelae. Similarly there has been a marked decrease in congenital syphilis and in other end results such as heart disease of syphilitic origin. I can find no evidence whatever that there has been any decrease in gonorrhea.

There are many other additional evidences of decrease in syphilis. University medical schools report the greatest difficulty in finding primary cases of syphilis to demonstrate to students. Dr. Harold Orr of the Social Hygiene Division of the Department of Public Health of the Province of Alberta, reports that the incidence of syphilis in Alberta jails has been reduced from 16 per cent in 1920 to 4 per cent in 1937. He states that in a clinic in Edmonton during the past year there has only been one primary sore and not a single case of secondary syphilis.

I believe that I am correct in saying that up to 1931-1932 in spite of deficiencies which might be demonstrated Canada had a venereal disease control scheme which was second to none in efficiency. The withdrawal of Dominion grants in 1932 had a serious effect on the venereal disease control scheme in Canada. These grants by the Dominion Government to the provinces were withdrawn in the face of recommendations made by the groups of specialist clinicians representing all of the provinces, called in conference in different parts of Canada. A review of the recommendations is interesting in that they summarize a number of the essentials for venereal disease control in the future.

The Canadian Conferences of Clinicians (specialists in the venereal disease field) recommended as follows:

1. That intensive propaganda and education in this field be continued and that the value of concerted action throughout the Dominion be emphasized.

2. That more attention be paid to the personal education of venereal disease patients in order to insure continuous attendance.

3. That clinics be kept open from 8 a.m. to 12 p.m. in order to provide for early treatment (within 8 hours after exposure).

4. That methods be evolved to insure the continuous treatment of transient patients by providing them with a form upon which

records of treatment given them may be inscribed by successive clinics or physicians.

5. That the problem involved in the treatment of indigents in rural areas be dealt with by provincial departments of health.

6. That provision for fever treatment of cases of general paralysis of the insane be provided in all large general hospitals.

7. That in view of the fact that many physicians still give voluntary service in venereal disease clinics provision be made for the proper remuneration of all physicians attached to venereal disease clinics.

8. That all venereal disease clinics be equipped with darkfield apparatus for the diagnosis of primary syphilis and that all hospitals with venereal disease clinics procure such apparatus.

9. That in view of the ever increasing number of patients attending genitourinary clinics showing the effects of mal-treatment of gonorrhea, teaching of medical schools of this subject be improved.

10. That similar facilities for the improved teaching of syphilis be established and that special reference be made to darkfield examination.

11. That the inclusion of specific questions on the subject of gonorrhea and syphilis in the annual examinations in medicine and surgery would be a distinct contribution in the campaign against venereal disease.

12. That medical associations be asked to include papers on venereal disease in their programs for meetings.

13. That meetings of specialist clinicians be held once a year possibly in connection with the meetings of provincial medical associations at which the latest methods and information on the subject might be discussed.

14. That a specific publication for the instruction of physicians in all phases of the question of venereal disease be developed.

These are but some of the recommendations which were brought forward as essential to the further development of the Canadian venereal disease control scheme and in order that these recommendations might be made effective it was urged that the contribution of the Dominion Government to the plan be increased.

I am able to report that there has been a renewal of interest, that this year for the first time since 1932 the Dominion Government has made a contribution to the scheme in the form of

payment for drugs used in treatment in clinics. This amounts to \$50,000.

A committee of the Health League of Canada has completed a book of instruction for the guidance of the physician which will be issued generally to physicians by the Dominion Department of Health. Plans for the carrying on of treatment in rural areas have been improved by the provision in some provinces of funds for the payment for treatment of indigents by private physicians, and necessary drugs are provided free. The provision of facilities for taking specimens for darkfield examination in outlying districts and transportation of such specimens to a central laboratory in a convenient mailing packet has facilities for diagnosis of early syphilis in remote areas.

Many of the improvements in the Canadian scheme still remain to be achieved. We have had a fine coöperative effort which has accomplished a great deal, yet we must acknowledge that during the last few years the progress which was characteristic of the early years of the movement has not been made. Essential and specific improvements in the scheme are suggested by the recommendations of physicians especially interested in the ultimate success of the venereal disease program, a few of which are described in this paper. Venereal diseases are controllable although as a problem they are more difficult to deal with than are most of the other major problems in public health.

Both in the United States and in Canada these dangerous maladies are a national problem, common to all states and all provinces. As such they deserve the attention of federal authorities. I believe that we have proved in Canada that under Dominion leadership a great deal can be accomplished. With the fine coöperative scheme you have developed in the United States you are achieving

similar results. I suggest that *only* under central leadership can such a problem be effectively dealt with.

Syphilis, toward the end of the Great War, was characterized by Sir William Osler as the greatest single cause of death among the infections. This meant that he considered that syphilis as a killer outranked tuberculosis, cancer, and pneumonia. As a matter of fact syphilis for a time in England was characterized as the "great killer." Syphilis in Canada is no longer the great killer. Hospital statistics prove that. Yet, syphilis we still have with us in spite of a yearly reduction in the incidence of primary cases, and the fact that in 1936 392 fresh cases of general paralysis of the insane were admitted to Canadian hospitals for the mentally ill, is proof that syphilis, although many of its end results have been almost eliminated, still does a great deal of damage. As for gonorrhea, serious though the disease is, there is little evidence that its incidence has been reduced either in Canada or elsewhere.

I believe that the future holds great possibilities not particularly because the seriousness of venereal diseases alone is recognized but because of the fact that it is becoming more generally recognized that most illness is preventable, that there is no logic in filling expensive hospital beds with people who should not become ill and cemeteries with the bodies of those who should still live. As nations recognize the fact that their greatest asset is long-lived healthy and efficient men and women, and as we build machinery for the preservation of health on a national scale these most tragic of maladies will disappear with the rest of the unnecessary germ-borne maladies which have destroyed the health and shortened the lives of humans in the past.

REFERENCE

1. Parran, Thomas. *A.J.P.H.* 26, 4:329 (Apr.), 1936.

Industrial Hygiene Program in a State Health Department*

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ANY program of industrial hygiene will depend upon two major factors: the definition, and the objectives of industrial hygiene.

Webster states that industrial hygiene is "a system of principles or rules designed for the promotion of the health of our industrial population." The objectives are the formulation, institution, and promotion of such principles or rules.

Based upon such a concept, the organization and development of a division of industrial hygiene require the close coöperation of many individuals and groups. Bristol¹ has outlined groups concerned as follows:

1. Employee and his dependents
2. Employer
3. Physician and his coworkers, such as dentist, pharmacist, nurse, chemist, engineer, social worker, and public health worker
4. Hospital—public and private—and allied institutions, such as clinics and health centers

To these I should like to add one other, the government—local, state, and federal. No one dares deny that governments have a right to be concerned about the health and well-being of their industrial population. They prosper only in so far as their people prosper financially, physically, and

mentally. A healthy industrial population not only safeguards and improves our national defense, but it also leads to increased production in factories, mines, and on farms, and therefore indirectly to an increased national income.

In order to bring the various groups concerned into a united action, it is necessary that all understand the problem, or as Sayers² has stated, "develop a viewpoint." I believe this viewpoint should be a common one and should involve a consideration of the following:

1. *The worker himself—his physical, mental, and social condition.* This consideration requires the concerted action of the employer, physician, dentist, nurse, pharmacist, and social worker. These people constitute a "team" to take inventory of a working man's health assets.

2. *Environmental conditions.* An understanding of these conditions requires the united action of the employer, the engineer, and the analyst whose findings must never be interpreted without the assistance of the physician and his knowledge of the health inventory of the workers exposed.

3. *Society in general.* This consideration involves "selling" industrial hygiene to all groups possible. It involves carrying the ideas of health

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conservation and promotion, sanitation, good housekeeping, and good health habits from the factories and work places into their homes where they may be of value to all dependents of our industrial population. It involves coordinating the activities and interests of employee, employer, hospital, and allied agency, physician and his co-worker, and the government. It involves an interest in, and an understanding of, labor and industrial legislation. And, finally, it requires a keen understanding of the relationship between income, housing, and health as pointed out by Kessler.³

To develop properly any division of industrial hygiene it is essential that an accurate health inventory of our industrial population be made. This requires not only preemployment, but also periodic, medical examinations. These should be thorough and should lead to a complete evaluation of the physical, mental, social, and psychologic condition of the worker. The findings should be used for proper placement; and an effort should be made to determine if there is a relationship between the findings and the worker's occupation, past or present. Neither labor nor industry has accepted fully the value of medical examinations, partly because there have been "chiselers" in both camps and partly because no one has really done a great deal about "selling" the merits of such a procedure. Those industries which have initiated such a policy, employees so affected, and almost all physicians, however, believe medical examinations at regular intervals will help much toward conserving and promoting good health. Page⁴ and others have very effectively emphasized the advantages.

A very forceful illustration of the advantages of preemployment examinations may be gained from figures obtained from one of our large Texas in-

dustries which recently constructed a new plant. When no preemployment examinations were required, their experiences led them to anticipate a cost of \$10,000 for hospitalization, medical care, etc., resulting from injuries and illness arising during the period of construction. They then adopted a policy of preemployment examination, examined 335 applicants, passing 291 as physically and mentally and psychologically qualified for the work. The total cost of medical care, hospitalization resulting from injuries, and illness arising during the period of construction was \$76. Adding to this amount the cost of medical examinations and the salary of a personnel director, there was still a saving of over \$5,000 in this one instance. Although no disagreement exists as to the value of such examinations, there is a definite misunderstanding among physicians and dentists as to who should make them and what should be done about them after they are made.

Physicians, nurses, and dentists can be well divided into three large groups:

1. Public Health
2. Industrial
3. Private or Family

A division of industrial hygiene may well serve as a disease finding agency for such groups as tuberculosis control, venereal disease, malaria, etc., and relay to each group respectively such findings as are of interest to it. Likewise, the local health officer should be advised and be expected to follow up and take care of such public health problems as may exist. This, therefore, would mean a division of industrial hygiene should serve as a clearing house for all other divisions as regards diseases found in industrial employees.

All abnormalities arising out of the nature of the employment should be reported to, and be handled by, industrial physicians and be paid for by the

responsible industry. The average practising physician does not have adequate time to study the advances made in physical and synthetic chemistry and to keep informed on the possible effects on health of the various materials and chemicals which may be used. This has been convincingly discussed by Legge.⁵

All conditions not directly associated with the nature of the employment should be referred to, and be handled by, the private or family physician and should be paid for by the patient in so far as he is able to pay, but ability to pay must not determine the availability of medical care. No one dares say that only those with contagious and infectious diseases who can pay should receive medical care.

Whether or not a division of industrial hygiene should be responsible for, and make physical examinations is being argued for and against. The merits of such a procedure are well emphasized by the activity in Mississippi under Felix Underwood, M.D., State Health Officer, and J. W. Dugger, M.D., Director, Division of Industrial Hygiene. Physical examinations are made of all factory workers. Such examinations include among the usual routine procedure a tuberculin test, X-ray of the chest of positive reactors, Wassermann, and blood smear for malaria.

An accurate occupational history, as well as a history of disease experience and immunization, is obtained. Those who need immunization receive it. A list of all those who have had typhoid fever is sent to the county health officer, so he may investigate for carriers. Medical findings are made available to the employee, who is advised to see his family physician for an interpretation, to the employer, and to the county health officer. Such a procedure in Mississippi has proved satisfactory. Fisher⁶ and Sappington⁷ have very

forcefully pointed out the benefit of employee health service.

In considering non-occupational diseases and their control, the activity of the E. I. DuPont de Nemours Company and the Caterpillar Tractor Company are of interest. In 1936 the medical department of the former company, under G. H. Gehrman, M.D., Medical Director, made a survey of the employees for syphilis and found 4.2 per cent had positive findings. These results were kept confidential between employee and medical department unless the employee refused treatment. A similar study was made by the latter company under the direction of Vonachen,⁸ and of 10,000 men examined 4 per cent had a positive Kahn test for syphilis. Where industries do not have their own medical department (and this is usually the case because most industries are relatively small), a division of industrial hygiene of the state health department could function. It must be emphasized, however, that under such a plan treatment would have to be provided by the family physician.

Not only should the physician and his coworkers be responsible for good medical examinations—physical, mental, and psychologic—but also they should:

1. *Play a very major part in procuring from industry accurate morbidity, mortality, and accident records.* Without such records there can be no intelligent approach to either the occupational or non-occupational disease problem. Records of absenteeism should be complete with regard to duration, frequency, and cause in each occupation of an industry. In this way only can a definite type of action be indicated. One example of the value of such records was well illustrated by Bloomfield⁹ in his discussion of evaluating the sickness problem needing attention in the iron and steel industry. These records should, of course, be available not only to the medical

department of the particular industry involved but also to public health officials—such as administrators of a division of industrial hygiene—so that the information may be used to conserve and promote health in other industries of a similar nature but without records of absenteeism.

2. *Teach employers and employees proper health habits—mental and personal hygiene.* When we realize that the report on "Medical Service in Industry and Workmen's Compensation Laws"¹⁰ recently published by the American College of Surgeons reveals that for each day lost from work because of occupational disease 60 days are lost because of industrial injury, and 885 days are lost because of non-industrial injury and illness, we can readily understand why a division of industrial hygiene may have difficulty in justifying its existence if it considers its problem to be only that of the study and control of occupational diseases. There can be no doubt that industrial hygiene must broaden its program to be one of industrial health conservation and promotion—a public health program.

3. *Emphasize the value of safe, adequate, and nourishing food and a well balanced diet.* The fads and fantasies of foods and diets affect no group more than the industrial group. The tempo of our age is conducive to "fast living" particularly among our working group. This frequently leads to disturbances of the gastrointestinal tract ultimately ending in fanciful, distorted, and unbalanced diets.

It is also believed by many authorities that the average American breakfast and lunch are entirely inadequate and unbalanced. Such conditions are thought to be conducive to the occurrence of industrial accidents.

4. *Supervise recreation and rest periods—emphasizing the probable relation of fatigue to accidents.* Recre-

ation among industrial groups must not only be encouraged but also be graded and supervised in order to prevent too strenuous exercises or over-indulgence. No one is more qualified to render this service than the medical man.

5. *Insure a safe water and milk supply as well as an approved sewage disposal system—including industrial wastes.*

6. *Supervise a program of accident prevention and first aid instruction.* This activity is usually taken over by other agencies. The "viewpoint" and plans for small industries might well be laid and made by a division of industrial hygiene.

7. *Promote and encourage rehabilitation—the value of which has been pointed out by Kessler.¹¹* This is an activity which has been sadly neglected. As preemployment and periodic medical examinations become more common, a higher percentage of prospective employees are likely to be refused employment. Many of these individuals with minor defects can be rehabilitated, and some agency must assume the responsibility of promoting or sponsoring such activity.

8. *Supervise hospitalization and convalescence.* Many employees, either intentionally or unintentionally, evade hospitalization; and many return to their work from an illness before they are fully restored to health. These individuals may be a hazard not only to themselves, but also to their fellow workers. A thorough medical check-up is very desirable after each illness before regular work is again entered into.

9. *Initiate ideas and institute a program for the reduction in the number of abortions.* The incidence of criminal abortions is unknown. However, all people are agreed that the numbers are enormous. Much of this condition is brought about by a lack of responsible and ethical source of birth control in-

formation. The lack of such information to women in industry who are in no economic position to bear children is deplorable. The solution, however, is still rather remote.

We pass on to the second major consideration—environmental working conditions. The place of the engineer in this field cannot be more effectively discussed than it has been by Bloomfield.¹² I will briefly recall some of the problems. Public health engineers and chemists are concerned not only with determining environmental conditions as they exist, but also with the effect of these conditions upon health. This, therefore, places them in intimate contact with the physician and his group with whom they work hand in hand. Engineers and chemists are also concerned with the effectiveness of control measures.

It has been the procedure in most states to make preliminary surveys of industrial establishments for the location of potential health hazards. This plan has been followed in Texas. The physician, engineer, and chemist can gain more if they make such surveys in company with each other. In these surveys observations are made of the materials used, processes involved, environmental conditions, by-products, finished products, etc. The potential health hazards located are probably identical in most states, and, therefore, Texas might well use the findings of Johnson, *et al.*¹³ in St. Louis. This statement, however, is not intended to detract from their value. We believe the greatest value is derived from the contacts with industry and the knowledge the surveyor gains of industrial processes.

Engineers and chemists of a division of industrial hygiene are really industrial sanitary officers. They concern themselves with problems of:

Lighting—adequacy, intensity, and glare
Ventilation and air space

Dust and fume control
Environmental air sanitation in general
Temperature and humidity
Sanitation—toilets, drinking fountains, wash-rooms, lunchrooms, sewer connections, and plumbing installations
Machine guarding
Protective clothing and devices
Fire prevention and protection
Housekeeping in general

This group of workers holds an enviable position in the general program of industrial hygiene. The tendency has been to emphasize occupational diseases and their control and to pay less attention to those other diseases which perhaps have no direct connection with occupation. The industrial hygiene physician has interested himself more in health engineering than the industrial hygiene engineer has interested himself in the promotion of better health regardless of conditions involved. Industrial hygiene physicians can well afford to absorb from these engineers the enthusiasm and interest which they manifest, and direct the program of industrial hygiene so that it will not only be a public health engineering program, but a public health program in the broad sense.

It is obvious that not only industrial hygiene physicians, but engineers too, must acquaint themselves with the economics of labor and industry as well as with legislation affecting these same groups. This problem requires a thorough understanding not only of environmental working conditions and the probable effect upon health, but also of human psychology. Sappington¹⁴ states that in 1935 legislation relative to compensation was introduced in over 40 states. Undoubtedly much of this was ill advised. Eleven states now have a general coverage act, 10 a schedule, and 2 a special coverage, 31 have a general designation for employments covered; 9 enumerate hazardous employments covered; 2 designate employments for gain; 4

enumerate extra hazardous employments; and 1 has a very limited classification covered. Thus we have a rather confusing system of coverage. It appears that no one would be in better position to pass on the merits of proposed or existing legislation than a division of industrial hygiene, and any legislative body certainly should avail itself of such guidance.

The third major factor to consider in formulating a program of industrial hygiene is the reaction of society in general. Because of the large number of groups and people involved, the task of developing a common viewpoint, of selling a program, and of making it acceptable to all groups is very difficult. What industry approves, certain groups of labor will automatically disapprove without just cause. What insurance companies recommend is often not satisfactory to industry. What is agreeable to all other groups may not be agreeable to "organized medicine." The task of bringing all groups together requires tact, diplomacy, firmness, sympathy, knowledge, understanding, and a fair sense of judgment. It requires the services of individuals who might be classed as "charming borrowers."

There are now 21 states and the District of Columbia which have compensation for occupational diseases in some form. Other states are certain to follow. Whether these states should be guided by their respective divisions of industrial hygiene in electing specific or general coverage may be disputed, but everyone must realize that a division of industrial hygiene will play a very important part in whatever program is adopted.

Finally, we come to the question of income and housing and the effects each may have upon health. Is it possible that we are approaching the entire health program from the wrong end? Can any permanent good arise

from any program we are now promoting in industrial hygiene unless, first of all, the economic status of the worker is improved? If workers were financially able to provide themselves and dependents with proper and adequate food, clothing, shelter, sanitary facilities, medicine, and medical care, would our task not be much simpler? I shall leave this for you to answer.

It is not to be implied, however, that any division of industrial hygiene should promote, sponsor, supervise, or carry out such a program as we have outlined. The program given represents our view of the problems existing in industrial hygiene. Those industries having their own medical services really have, or at least should have, units of industrial hygiene functioning according to the broad interpretation. Their experiences, however, should be made available to other groups. Those industries having no medical services (and this includes a greater number of them) must be provided for either through their own efforts individually or collectively or through those of a government. At any rate, some central agency must assume the initiative. Such a plan will lead to uniformity in form of reporting sickness, be it occupational or otherwise; in control measures; in medical examinations with subsequent placement of men in jobs for which they are fitted; in compensation and rehabilitation; and finally in disseminating knowledge for health promotion.

These are the objectives toward which George W. Cox, M.D., State Health Officer of Texas, is striving to direct his Division of Industrial Hygiene.

In summary, it appears that a well balanced and properly functioning division of industrial hygiene should:

1. Be a part of a health department.
2. Consist of personnel trained to think of industrial hygiene as a public health problem

involving not only health conservation in its broad sense, but also health promotion and rehabilitation, be it physical or mental.

3. Consist of, or have available for consultation and assistance, physicians, dentists, engineers, chemists, nurses, social workers, educators, and, last but not least, competent administrators.

4. Have a part in the promotion and guidance of the various activities discussed even though it may not carry out the actual work through its own personnel.

5. Act as a clearing house for all agencies as regards finding of diseases in our industrial population.

6. Promote a health program for the 49 million wage earners of our country, a group entitled to a better health service than they now receive.

REFERENCES

1. Bristol, Leverett D. Industry and the Future of Medicine. *Indust. Med.*, June, 1934.
2. Sayers, R. R. President's Address: Health Promotion in Industry. *Indust. Med.*, 7:410-415 (July), 1938.
3. Kessler, Henry H. Social Significance of Industrial Medicine. *A.J.P.H.*, 26:158-164 (Feb.), 1936.
4. Page, Robert C. The Importance of Pre-employment and Periodical Medical Examinations. *Indust. Med.*, 7:362-364 (June), 1938.
5. Legge, Robert T. Occupational Diseases and Industrial Surgery. *Indust. Med.*, 7:217-225 (Apr.), 1938.
6. Fisher, Hart E. Placement of Men from a Physical Standpoint. (Address delivered at First Upper Mississippi Valley Safety Conference, Chipewa Falls, Wis., June 18, 1936.)
7. Sappington, C. O. Does Industrial Health Work Pay? *Illinois J. Commerce*, Mar., 1932.
8. Vonachen, H. A. Syphilis in Industry. *Indust. Med.*, 7:416-419 (July), 1938.
9. Bloomfield, J. J. Engineering Aspects of Problems in Industrial Epidemiology. *Indust. Med.*, 7:377-385 (July), 1938.
10. Newquist, M. N. *Medical Service in Industry and Workmen's Compensation Laws*. American College of Surgeons, 1934. (New edition, 1938.)
11. Kessler, Henry H. Rehabilitation of the Disabled. *Am. J. Surg.*, 31:316-328 (Feb.), 1936.
12. Bloomfield, J. J. The Engineer in Industrial Sanitation. *Civil Eng.*, 8:167 (Mar.), 1938.
13. Bloomfield, J. J., Johnson, W. Scott, and Sayers, R. R. The Potential Problems of Industrial Hygiene in a Typical Industrial Area in the United States. *Pub. Health Bull.* 216 (Dec.), 1934.
14. Sappington, C. O. The National Occupational Disease Situation. *Kiwanis Magazine*, May, 1936.
15. Wenzel, R. E. Contrasts in Workmen's Compensation Legislation. *Discussion of Industrial Accidents and Diseases, Bull.* 17, 1937, p. 19.

Is the Lowering of the Death Rate Due Principally to Curative Medicine or to Preventive Medicine?

"Preventive medicine . . . with hygiene and social progress, is playing a more important rôle than curative medicine in the preservation of human life." This is the conclusion which Dr. René Sand draws from a study of the causes of the 28 per cent decrease in the general death rate in Belgium from 1910 to 1935. The importance of preventive medicine is generally recognized in certain diseases, such as smallpox, but the part of preventive medicine is less commonly realized in such conditions as respiratory infections, tuberculosis, and puerperal infections. Social legislation, improvement in conditions of housing and industry, increase in salaries, education, improvement of hospitals, increase in the number of clinics and sanatoria, and the preventive work of the doctor and

the visiting nurse have all helped more to decrease the death rate than have progress in therapeutics and diagnosis. However, Dr. Sand points out, it is becoming increasingly difficult to separate preventive and curative medicine because much of modern treatment has a preventive effect. Dental care prevents dental abscesses and pyorrhea; syphilitic treatment prevents the complications of the later stages and also the communication of the disease to others; when the doctor prescribes a diet, he thinks not only of curing the disease, but of the nutrition of the individual afterward. For such reasons as these, preventive and curative medicine are separable only in theory, and the importance of curative medicine cannot be minimized.—*Imprim. Med. Scient.*, Sept. 18, 1938. Bruxelles.

Value of Phosphatase as an Indicator of Pasteurization*

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THE phosphatase test has found a wide application in the control of pasteurization of milk. In New York State it is being used as a routine laboratory procedure in the supervision of pasteurizing plants as well as in the sanitary control of milk supplies. Continued experience indicates that the inactivation of this enzyme can be used to detect improper treatment of milk almost without failure.

Our early studies of the modified Kay and Graham test¹ indicated that a value of 0.04 mg. of phenol per 0.5 ml. of milk was the average maximum limit for milk completely pasteurized at 143°F. However, variations in the operation of pasteurizing equipment, particularly in the time and temperature of preheating and in the methods of cooling, affect the degree of inactivation of phosphatase. We now regard as properly pasteurized a milk which has a phenol value of less than 0.05 mg. per 0.5 ml. The plan of interpretation adopted considers as slightly underpasteurized milk with a phenol value of 0.05–0.08 mg. per 0.5 ml.; as underpasteurized, that with a value between 0.09 and 0.15 mg. per 0.5 ml.; and as an indication of gross under-

pasteurization, a value of 0.15 mg. per 0.5 ml., or greater.

It was also thought that the inactivation of phosphatase could be measured with sufficient sensitivity to detect accurately a reduction of 5 minutes in the holding time at 143°F., a lowering of the temperature of heating by 1°, or the addition of 0.1 per cent of raw milk. In the comparative study conducted for the Association of Official Agricultural Chemists² it was found that this precision was not attained consistently in the examination of samples representing such treatments. During a prolonged period of preheating such as is practised in many pasteurizing plants, the enzyme is progressively inactivated to such a degree that the phenol value after a technical 25 minute holding period is indicative of complete pasteurization, although the legal requirements for pasteurization at 143°F. have not been met. A drop of 1° or more in temperature of heating was detected in this comparative study in 92 per cent of the samples so treated. Pasteurization at 142°F., therefore, necessitates the establishment of a code of phenol values which differs from that used for pasteurization at 143°F.

Neither of these variations in treatment is of practical importance. The addition of 0.1 per cent of raw milk,

* Read before the Laboratory Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

TABLE I

Phosphatase Values of Known Samples of Pasteurized Milk (143° F.), of the Cream Separated by Gravity at 40°± F., and of the Skim Milk

Total Samples Examined	Cream							Whole Milk			Skim Milk			Control mg./0.5 ml.
	<0.05 mg./0.5 ml.		0.05-0.08 mg./0.5 ml.		>0.08 mg./0.5 ml.		Control mg./0.5 ml.	mg. phenol/ 0.5 ml. sample			mg. phenol/ 0.5 ml. sample			
	No.	%	No.	%	No.	%	Max.	Max.	Min.	Aver.	Max.	Min.	Aver.	
139	105	75	26	19	8	6	0.02	0.05	0.01	0.03	0.04	0.02	0.02	

however, may be of great significance since even such an amount of contaminated raw milk would readily contaminate the pasteurized product. In the comparative study² the various laboratories detected 0.1 per cent of added raw milk in only about one-third of the samples so treated. A tendency in many pasteurizing plants to overheat the milk slightly, reduces the phosphatase content sufficiently so that the addition of this amount of raw milk gives a phosphatase value which falls within the limits established for complete pasteurization. Quantities of added raw milk greater than 0.1 per cent apparently, however, can always be detected by the laboratory test.

Whereas the inactivation of phosphatase has proved a useful indicator of pasteurization of milk, persistent reports have been received that samples of cream separated after pasteurization frequently give a reaction of underpasteurization, even when plant inspection indicates that the treatment was adequate. No instances have been reported in which cream, separated from raw milk and then properly pasteurized according to standard procedures, failed to give a definite reaction of pasteurization with phenol values definitely below 0.05 mg. per 0.5 ml. Since the earliest evidence of failure of the test in the examination of cream was concerned with samples which had been separated from pasteurized milk by gravity, we attempted some analysis of the problem by examining 139 samples of known pasteurized milk collected by

the staff of the Bureau of Milk Sanitation. The whole sample was first thoroughly mixed and a 10 ml. portion removed for subsequent examination. The remaining volumes were allowed to stand for 48 hours at 40°F., when portions of cream and skim milk were removed. The residues were again thoroughly mixed and additional portions taken for examination. As shown in Table I, only 75.5 per cent of the samples of cream had a phosphatase value indicative of pasteurization. In all cases the phenol values of the whole milk and the skim milk indicated adequate pasteurization. The phenol value of the milk remixed after separation were always found to be the same as that originally obtained.

A similar study has been made of cream separated mechanically from known commercially pasteurized milk, also collected by the Bureau of Milk Sanitation. Temperatures of pasteurization were 142°-143°F. for 30 minutes, 160°-169°F. for 15 seconds, and 180°-189°F. for 15 seconds. The usual temperature at which this cream was separated was between 90° and 110°F., but samples were also collected representing temperatures of separation between 90° and 60°F., and less than 60°F. Irrespective of the temperature of pasteurization or of separation, the phosphatase value of the mechanically separated cream increased with alarming frequency to a value indicative of underpasteurization and, in a few instances, even of gross undertreatment. The phosphatase

TABLE II

Phosphatase Values of Known Samples of Pasteurized Milk, of Mechanically Separated Cream, and of the Skim Milk

Temperature of Pasteurization	No. of Samples	Cream								Whole Milk				Skim Milk				Control mg./0.5 ml.
		<0.05 mg./0.5 ml.		0.05-0.08 mg./0.5 ml.		>0.08 mg./0.5 ml.		Control mg./0.5 ml.	mg. phenol/ 0.5 ml. sample			mg. phenol/ 0.5 ml. sample						
		No.	%	No.	%	No.	%	Max.	Max.	Min.	Aver.	Max.	Min.	Aver.				
		Separated at >90° F.																
180°-189° F. for 15 seconds	58	33	57	21	36	4	7	0.02	0.03	0.01	0.02	0.02	0.015	0.018	0.02			
160°-169° F. for 15 seconds	24	19	79	5	21	..	..	0.02	0.03	0.015	0.023	0.03	0.01	0.02	0.02	
142°-143° F. for 30 minutes	34	32	94	..	..	2	6	0.02	0.03	0.01	0.02	0.02	0.01	0.015	0.02	
Separated at <90° F., >60° F.																		
180°-189° F. for 15 seconds	51	20	39	21	41	10	20	0.02	0.03	0.01	0.02	0.03	0.01	0.02	0.02			
170°-179° F. for 15 seconds	4	1	25	1	25	2	50	0.02	0.03	0.02	0.025	0.02	0.015	0.018	0.02			
160°-169° F. for 15 seconds	40	24	60	13	33	3	7	0.02	0.03	0.01	0.02	0.03	0.01	0.02	0.02			
142°-143° F. for 30 minutes	13	13	100	..	..	..	..	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Separated at <60° F.																		
180°-189° F. for 15 seconds	8	4	50	4	50	..	..	0.02	0.02	0.015	0.018	0.02	0.015	0.018	0.02	
170°-179° F. for 15 seconds	4	..	..	1	25	3	75	0.02	0.04	0.025	0.033	0.03	0.02	0.025	0.02	
160°-169° F. for 15 seconds	15	13	90	2	10	..	..	0.02	0.03	0.01	0.02	0.03	0.01	0.02	0.02	

TABLE III

Phosphatase Values of Pasteurized Milk and of Cream Separated by Gravity at Various Temperatures

Temperature of Pasteurization	Cream						Whole Milk				Control mg./0.5 ml.
	No. of Samples	<0.05 mg./0.5 ml.		0.05-0.08 mg./0.5 ml.		Control mg./0.5 ml.	mg. phenol/0.5 ml.				
		No.	%	No.	%		Max.	Max.	Min.	Aver.	
Separated at 40°± F.											
180°-182° F. for 15 seconds	3	3	100	..	..	0.02	0.017	0.015	0.016	0.02
160°-164° F. for 15 seconds	4	3	75	1	25	0.02	0.02	0.015	0.018	0.02	
142°-143° F. for 30 minutes	4	4	100	..	..	0.02	0.017	0.017	0.017	0.02
Separated at 68°± F.											
180°-182° F. for 15 seconds	3	3	100	..	..	0.02	0.017	0.015	0.016	0.02
160°-164° F. for 15 seconds	4	3	75	1	25	0.02	0.02	0.015	0.018	0.02	
142°-143° F. for 30 minutes	4	4	100	..	..	0.02	0.017	0.017	0.017	0.02
Separated at 98°± F.											
180°-182° F. for 15 seconds	3	3	100	..	..	0.02	0.017	0.015	0.016	0.02
160°-164° F. for 15 seconds	4	3	75	1	25	0.02	0.02	0.015	0.018	0.02	
142°-143° F. for 30 minutes	4	4	100	..	..	0.02	0.017	0.017	0.017	0.02

values of the corresponding whole and skim milk indicated proper pasteurization. In order to eliminate the possibility that the cream had become contaminated during the process of separation with some substance other than phosphatase which would react with Folin's reagent, a control test was made on all samples examined. These were without exception low and did not differ from the control values found on examination of the whole milk. The results are given in Table II.

Representative samples of the cream which had a high phosphatase value after separation were then repasteurized in the laboratory and again tested. In all cases a low value indicative of complete treatment was found, showing that the substance causing the high reading in separated cream is heat labile.

In order to obtain further information concerning the effect of temperature of separation, we examined a few samples of cream separated by gravity from pasteurized milk stored at temperatures of 98°F., 68°F., and 40°F. To avoid interference by bacterial growth at the higher temperatures, the samples of milk were each allowed to stand for 2 hours to permit sufficient cream for the test to rise. The results, given in Table III, again show a tendency for the phosphatase value of cream to increase beyond that of the original milk. As indicated, the whole and skim milk were found properly pasteurized in all cases.

A sufficient number of samples has

not yet been examined to indicate the frequency of this discrepancy between milk and cream. However, the data suggest that caution must be exercised in the interpretation of the results with cream, particularly since much of that from small pasteurizing plants is separated from excess pasteurized milk. When the laboratory reports indicate inadequate heat treatment of cream samples, thorough inspection of the pasteurizing process should be made before the product is considered actually underpasteurized. It is difficult to explain the cause of this increase in phosphatase content. It is possible, however, that since the enzyme is not completely inactivated at 143°F. for 30 minutes, or 160° or 180°F. for 15 seconds, the fat particles in rising from the milk, either under action of gravity or during mechanical separation, absorb and concentrate in the cream layer sufficient phosphatase to give a reaction of underpasteurization.

In examination of this point, samples of raw whole milk, cream, and skim milk were collected at the separator of a commercial dairy. In order to permit accurate measurement of the phosphatase content of these samples, 0.3 per cent and 0.5 per cent dilutions of each in pasteurized milk were prepared. The results of this experiment, given in Table IV, indicate clearly that in the presence of active enzyme in the whole milk there was a marked concentration of phosphatase in the cream fraction after separation.

It is essential that further study be

TABLE IV
*Phosphatase Content of Raw Whole Milk, of the Cream, and of the Skim Milk
Diluted with Pasteurized Milk*

Sample	No. of Samples	Mg. phenol/0.5 ml.					
		0.3 % Dilution			0.5 % Dilution		
		Max.	Min.	Aver.	Max.	Min.	Aver.
Whole milk	4	0.07	0.06	0.07	0.13	0.09	0.12
Cream	4	0.34	0.28	0.31	0.46	0.34	0.43
Skim milk	4	0.055	0.05	0.05	0.07	0.07	0.07

pointed out, for all practical purposes of quarantine and control, measures against the *Aedes aegypti* have proved sufficient and probably will suffice in the future. The discovery, however, furnishes much food for thought and makes us realize more than ever the rôle which insects have played in the past and now play in the transmission of diseases.

We have several times pointed out the apprehension which exists over the possible spread of yellow fever to countries like Egypt and Asia, the new factor in this case being the tremendous increase in travel by airplanes. It is evident that once again must we revise not only our ideas but to a certain extent our methods in the control of certain diseases. We have felt sure that yellow fever would never again gain a foothold on the North American continent. We can still hold to this belief with a large degree of confidence, the more so since heretofore possible and unsuspected dangers have been detected and can be guarded against.

REFERENCE

1. *Science*, Oct. 28, 1938, p. 410.

APPRAISING LOCAL HEALTH WORK

THE publication of the *Appraisal Form for Local Health Work* by the American Public Health Association¹ adds another contribution to the impressive list made by the Committee on Administrative Practice and indicates further advance in the development of appraisal methods. It is noteworthy that public health programs of rural counties have progressed sufficiently to cause the committee to prepare a single Appraisal Form to be applied, with some adaptation, in both rural and urban areas. This Form combines selected features of the *Appraisal Form for City Health Work*, first printed in 1925, and the *Appraisal Form for Rural Health Work* later issued in 1927, and includes revisions and additions of new indices in line with tested experiences.

Surveys of health conditions were undertaken in England nearly a hundred years ago, Chadwick's report in 1842 on "Sanitary Conditions of the Labouring Population of Great Britain" being well known. The first sanitary survey in the United States was made by the Massachusetts Sanitary Commission, headed by Lemuel Shattuck, in 1849.² Probably the first step toward the development of local health appraisal methods was the preparation in 1875 of a List of Questions relating to the sanitary condition of a city or town, by a committee of the American Public Health Association. The Chairman, John S. Billings, M.D., explained the purpose as follows: "These questions are intended to obtain, as far as possible, the information which would be desired in estimating the healthfulness of a given place, and to ascertain the local and especially the preventable cause of disease at that point. Facts and not opinions are desired, and the questions are drawn up in that point of view."³ While quite complete for stock taking of sanitation facilities and procedures, these questions naturally omitted many of the features now recognized as of primary importance in a modern public health program.

A new era in community studies began in the early years of the present century. The Pittsburgh survey⁴ initiated in 1907, primarily as a social and educational

undertaking, was followed by the taking of community case histories throughout the United States. Furthermore, in response to the official requests of governors and mayors for an appraisal of the health machinery which was so important a part of their respective governments, the Surgeon General of the Public Health Service assigned physicians of his staff for this purpose, with valuable results in the broadening of legal authority and the enlargement of functions of state and local boards of health.

Based on the results of extensive surveys and on group judgment of health officers and other public health workers, the Committee on Administrative Practice developed the Appraisal Form to facilitate the analysis of community health service against a background of social and health conditions. This measuring rod aims to help in determining the adequacy of public health work in relation to the magnitude and type of local problem. The Appraisal Form does not attempt to determine with finality the relative importance and proper place of all local problems. It selects certain problems which experience has shown are common in varying degree to most communities and uses the services rendered in these fields as a gauge of the health efforts of the community in a particular field. The new edition consists broadly of three parts: descriptive survey of facilities, appraisal of health activities, and selected indices of community characteristics related to health. This instrument enables a health officer or a surveyor to take account of stock periodically, and is a valuable adjunct to personal field observations.

An important contribution was also made to the survey method in 1936 through the development of objective indices of health in relation to environment and sanitation by a member of the staff of the Health Organization of the League of Nations.⁵ The plan involved an attempt to formulate a series of objective data which are deemed desirable in order to arrive at a more complete and a more precise appreciation of health conditions than is ordinarily obtained. This system does not establish a unit rating, but is rather meant to indicate, describe and measure local problems. In October, 1938, the Committee on Health Indices of the League met in Geneva and revised the schedule which had been utilized for two years. The anticipated next step will be the application of the new schedule to a number of health jurisdictions in various parts of the world.

With the advancement of public health and the changing problems of society to be considered, the administrator is faced with the responsibility of analyzing community programs and of determining relative values so far as practical. Application of appraisal methods and scrutiny of health indices may assist materially in the evaluation process.

REFERENCES

1. *Appraisal Form for Local Health Work*, Committee on Administrative Practice, American Public Health Association, first edition, 1938.
2. Whipple, George C. *State Sanitation*, Vol. 1. Harvard University Press, 1917.
3. *Medical Education, Extracts from Lectures, delivered before the Johns Hopkins University, Baltimore, 1877-78*, by John S. Billings, M.D. Wm. K. Boyle & Son, Steam Book and Job Printers, Baltimore, 1878.
4. *The Pittsburgh Survey*, Russell Sage Foundation, New York, 1907.
5. *Quart. Bull., Health Organ., League of Nations*, Vol. V, Dec., 1936, 901-1081; see also comprehensive discussion of health indices by K. Stouman and I. S. Falk. *A.J.P.H.*, 27, 4:363-370 (Apr.), 1937, and League of Nations, publication of the Health Organization. C. H. 1382.

SANITARY DISPENSING OF BEVERAGES

TWENTY years ago an article in this *Journal*¹ called attention to the dangers of contaminated glasses and dishes in the spread of respiratory diseases. Since that time, much progress has been made in the control of this hazard by appropriate legislation, by the development of chemical and physical methods of sterilization, and, more recently, by the use of ultra-violet rays having bactericidal powers.²

The magnitude of this problem is indicated by the continued widespread use of glasses and other eating utensils in public restaurants, soda fountains, taverns, and roadside stands. It is estimated, for example, that some four and a half billion bottles of carbonated beverages are sold annually in this country, while more than ten billion glasses of draught beer are consumed in the United States every year. Add to these figures the glasses and cups used in public places for milk, coffee, tea, fruit juices, and other beverages, including water, which is still favored by some consumers, and the total obviously reaches a staggering figure.

In addition to the problem of adequate cleansing and sterilization of the utensils that come in intimate contact with many individuals, there is also the sanitary problem of proper dispensing of various beverages from bulk containers. Despite the growth in popular favor of bottled and canned beer, for instance, draught beer over the counter still accounts for considerably more than half of the sales of this farinaceous product, and newly developed methods for cooling its containers and retaining its pleasing flavor may make this beverage even more popular.

While the old-fashioned type of loose milk has been prohibited by law in most communities, devices have been perfected for the hygienic dispensing of pasteurized milk from bulk containers in restaurants. After more than three years' study, seven such devices have been approved by the Health Department of New York City, and are being installed in public eating places at a fairly rapid rate. There is no reason why such devices should not be permitted and employed if it can be demonstrated to the satisfaction of discerning health officials that in construction and operation such devices will consistently safeguard the public health.

The essential features of such sanitary dispensing gadgets are simplicity and ease of operation. They should be made of materials that not only resist contamination and are non-toxic, but are so constructed that they may be frequently and easily disassembled and quickly and effectively cleansed or sterilized in boiling water or appropriate chemical solutions.

The formulation of standards for such devices is, of course, only a part of public health control. Adequate and reasonable enforcement by health authorities of hygienic practices in the dispensing of these billions of beverages is equally significant.³

REFERENCES

1. *A.J.P.H.*, 9, 1:25-28, 1919; *Ibid.*, 9, 11:849, 1919.
2. Fellers, R. V. *Am. City. Aug.*, 1938.
3. *A.J.P.H.*, 28, 1277-1284, 1938.

PUBLIC HEALTH EDUCATION*

"Short Words Pack a Punch"—

A master writer, Gelett Burgess, under the above title, makes a plea and points the way. The writer and speaker on health should read the whole of the short article. Here are two selections:

This is a plea for the use of more short words. For through the lack of them our speech grows weak and may hold more sham than true thought. Long words are apt at times to hide or blur what one thinks; but short words say just what they mean, and do not leave you in doubt. They are clear and sharp, like signs cut on a rock.

Of course, if one has deep or strange or high, shrewd thoughts to tell, one must use long words more or less; but if you would like to say things with force, it is well to learn first to use short words as much as you can. It will make your style crisp and give it zest when you talk or write.

Friend, read the Good Book. Read the tale of Ruth, read of Saul and Lot, and all the rest, and see how wise and deep are the short crisp words of our great tongue. To be sure, the tales are not told all in words as short as those I use here, but they are all good old words that are couth and yare and there are few long ones. When they tell a tale you can see what goes on as if in a play, by the sheer spell of plain, free speech that can say what it means to a mere child and not be lost.

Short words are words of might.

In *Your Life*, 354 4th Ave., New York, N. Y. Nov., 1938. 25 cents.

Pictures in Continuity—Not a picture to tell this, and another to tell that. But a group of pictures to tell this and this about that. Such is the practice of more and more newspaper rotogravure editors, as brought out in

an article in *Editor and Publisher* (Times Bldg., New York, N. Y., Dec. 17, 1938).

One editor says:

"I don't mean . . . that every picture in our section has to be part of a continuity series. We use a good many single shots when we think we have shots that are interesting. But we are aiming at one goal, to make every picture tell a story, just as we attempt to make every block of type tell a story."

A few hospital and other annual reports have adopted this technic, but doubtless more health agencies could do the same.

Another editor emphasizes a point in handling pictures:

"In my format I have eliminated all ginger-bread cut-outs and designs around pictures, all ovals and trick make-up. I make each spread of pictures tell a story, and the photographs are laid out in simple form so that the eye will not be attracted from the picture itself."

Frequent examples of picture continuity idea will be found in *Life*, *Look*, and other picture magazines.

Continuity would do a lot for pictures in exhibits, but there pictures must have size as well as story. At Kansas City, we had pictures too small to tempt anyone even to look for a story.

Man in the Museum—Under this title, Dr. Bruno Gebhard, of the American Museum of Health, presented a paper before the American Museum Association.

A few selected paragraphs:

My personal feeling is, and it is based on more than ten years of very detailed experience, that a Museum on Man which is only of an explanatory type similar to most of our biological or anthropological divisions has

* Please address questions, samples of printed matter, criticism of anything which appears herein, etc., to Evart G. Routzahn, 130 East 22nd St., New York, N. Y.

only a very small appeal to the masses of the people. What people really want to know is "How shall we live?" . . .

Man as a living organism makes it necessary to look for special methods of presentation. Whenever it is possible, three dimensional models, animated diagrams and personal participation should be included. The personal participation may start with the invitation "please push button," instead of the old "Don't touch!" The visitor may test his own strength of the muscles, the capacity of his lungs, the absence or presence of color blindness, or the power of vision. There may be a demonstration of the beating of the visitor's own heart, its frequency and its very dramatic sound, as it has been done in the last Paris Fair. The personal participation may be very simple, but it always teaches a real lesson. It aids in fixing the message of the special item in the mind of the visitor. Personal participation is also a good remedy against museum fatigue.

We all realize how important it is to have motion in our exhibits, sometimes in combination with light such as a model of the Circulation of Blood. Animated diagrams have proved their educational value if logically related to the subject matter. Wherever we can we should visualize biological figures which we tell the public. The amount of air a person breathes through his lungs in one day can be shown by a cage made from wire hanging from the ceiling.

The Transparent Man—a life-size figure which shows by lights the location and relation of the different organs—is at present unsurpassed as a feature of the three dimensional model. . . .

More or less, we are not allowed to show Man in his body structure only. We have to demonstrate at least the function of the body. In other words, we should not have a section on "Skeleton and Muscles," but on "Walking and Working." We have to make a stronger attempt to show Man in his mental construction and in his emotional make-up. If we show the fundamentals of personal biology we should then show that nobody is in this mold by himself—that we all are only a link in a chain, that we all are born and live in families, that we have ancestors and heirs. . . .

Right or Wrong, or Which Is Which?—With all the varied forms of question and answer broadcasts, it seems a pity that health is not given its opportunity in perplexing radio

audiences. Anatomy, physiology, sanitation and hygiene, and related special sciences should furnish a wealth of good material.

A file of *Hygeia* alone should provide material for several different broadcasts for several years.

To Be a Puppet Showman—There are many books on puppetry. One of the best for amateurs is "Be a Puppet Showman," by Remo Bufano. Century Co., New York, N. Y., 1933. \$2.50. The author is a master puppeteer, and he is a sympathetic guide to the beginner. His book is easy to read, and his information is easy to use.

It is hoped that the combination of craftsmanship and showmanship offered in puppetry will lure some health workers. It is a hobby with health education possibilities.

Also we hope that several health agencies will test collaboration with school and crafts groups to enlist children and young people in puppet making with health education as a by-product.

Bufano emphasizes the long history of puppets in presenting "serious" plays. Puppet plays need not be slapstick, and they can be given with a surprising appeal to adult audiences.

Health Education in Y.W.C.A.—Major emphases for 1938-1940 are announced by National Board, Y.W.C.A., 600 Lexington Ave., New York, N. Y.

The health education program in the Association should include individual service on personal health problems; educational programs relating to health and recreation; activities that build health and develop skills in recreation and the provision of opportunities for continuing participation in these recreational activities. Responsibility for this program is shared by all groups in

the association. Such a program constitutes a legitimate cost to the association and should be so budgeted.

The emphases for the biennium will be:

- a. Nutrition, relaxation and sex education.
- b. Work on community health problems and coöperation with public and private health agencies.
- c. The study of administrative practices in relation to program trends.

Coöperative Publication in New Jersey—Some 19 local health departments in New Jersey participate in a joint publication plan directed by John Hall, of Freehold, N. J., Executive Secretary of the New Jersey Health and Sanitary Association.

By this plan each department issues, in its own name, a 4 page illustrated bulletin five times a year. The cost is \$12.50 per issue, for 500 copies; \$20.00 for 1,000; \$1.00 for each added 100; specially prepared pages, each \$4.00 in addition.

For two years the State Department of Health has paid for three-fifths of the cost.

Doubtless, for many readers the limited size is an advantage.

"When Everyone Knows"—This is the title of the annual report of Canadian Dental Hygiene Council, 170 St. George St., Toronto, Ontario.

An organization diagram shows a wide range of coöperative effort. A variety of oral hygiene material is listed. An Ontario mouth hygiene campaign is described.

The objectives of the Council:

When every person in Canada knows what every physician, dentist, and health worker knows—that diseased teeth are one of the most common causes of ill health, and further, when everyone knows what scientific findings declare—that diseased teeth may be prevented through proper diet, careful attention to mouth hygiene, and early operative treatment, all of which involves very little financial expenditure—then the Canadian Dental

Hygiene Council will feel that it has fully performed its task, for this is what the council is striving to teach.

Who Wants To See Pictures?—Or, examples of charts, or interesting cover pages, etc.? We could use more of such material if our readers will send it in? See address at foot of this page in every issue of the *Journal*.

"If Any Money Is Left Over"—In "Four Years of District Health Administration in New York City," by Dr. J. L. Rice and Dr. M. W. Barnard, in *Milbank Memorial Fund Quarterly*, 40 Wall St., New York, N. Y. (July, 1938), under "Health Education":

Of all the district services the one which is probably best suited to localization is health education. Effective teaching of health work must be based on an intimate understanding of the people to be taught. Subject matter must be adapted to many interests, traditional thought patterns and levels of intelligence. Health education seems also to be the field of public health which is least thoroughly geared into public health programs throughout the country. Too often it is the thing to be done if any money is left over. Trained personnel, tested procedures, and funds are inadequate. Four years of district experience have shown both the urgent necessity for organized health education among the people and some of the effective ways in which this can be done on a localized basis. Development of this work is one of the outstanding plans in the district program.

Check Your Shipping Department—Especially in quite large organizations the shipping of health education material by mail or otherwise is far removed from the office which lovingly, and with meticulous care, plans and prepares the posters and other publications.

Some such material received by the writer has arrived in bad shape because of careless handling in the shipping department, or through efforts to save a small fraction on the cost of the printed matter.

One practice is to mail a single poster, or a small lot of posters, rolled in a

flimsy cardboard cover which is most likely to be crushed in the mail.

Another disconcerting practice is to use a too small mailing tube into which the poster or large printed piece must be crowded by the shipping clerk, so that in some cases the tube must literally be removed in pieces if the enclosure is to be taken out whole.

Anyway, the rolling of a bundle of assorted pamphlets, broadsides, and posters gives the recipient an annoying job of getting each separate item rolled flat before it can be examined.

Again, those whose monthly bulletin or health journal is rolled for mailing might well consider if the loss of good will is a fair equivalent for the slight saving in cost.

To help make sure as to how matters go in the shipping or mailing rooms, one might order sample shipments to one's home address, as well as to the addresses of several friends.

And it may be well to bear in mind that in the course of time, with changes in personnel, shipping practices may be changed radically without official intent.

It Can Be Done — Government health education printed matter can be made to look interesting. For proof see a new folder so readable in appearance that you won't believe it came from the U.S.P.H.S. until you see the modest credit line at the foot of the last page.

"Syphilis: It's Cause—It's Spread—Its Cure," is an 8 page folder prepared to supplement efforts of physicians and clinics.

"It is clear. We tried it on patients at a city clinic, on a workers education group, on a grade school age group, on college students. We revised it until it answered their questions in a way they would understand. Then we added the pictures to help drive home the story."

"It is inexpensive. It may be secured from the Superintendent of Documents in Washing-

ton, D. C., for \$1.00 per 100 copies. In smaller quantities five cents each. But give one to each patient on the occasion of his first visit and it should save many cases for many treatments."

Making a Bibliography More Useful—What is a bibliography for? How can it be made to serve the desired purpose?

These questions arise more and more frequently as we examine the reading lists included with reports and other publications.

The latest is a bibliography accompanying "Tuberculosis in Philadelphia," by A. M. Lowell, Research Secretary, Philadelphia Health Council and Tuberculosis Commission, 311 S. Juniper St.

The last 2 of 54 mimeographed pages lists articles, pamphlets, and reports:

... sources which will permit a more intensive study of the tuberculosis problem in Philadelphia.

Of the 24 references 11 or 12 contain Philadelphia data. The other references would help in the "intensive study" of any other city as much as in further Philadelphia studies. *Would it not have been worth while to have indicated the sources of local data?*

Without guessing who might make a further "intensive study" in Philadelphia, *would it not be helpful to have added concise annotations to point out the significance of at least some of the general references?*

DATES AHEAD

Are you preparing for a future commemoration of your department, your agency, or of some special aspect of your activities? An editorial, "Historical Data and Anniversaries," in *Hospitals* (Am. Hos. Assn., 18 E. Division St., Chicago, Ill., Jan., 1939) should interest more than hospitals. Two paragraphs say:

Few hospitals preserve the data that make for historical record. A metal fire-proof

cabinet should be provided for minute books, photographs, portraits, newspaper clippings, and data referring to the contemporary activities of the hospital.

The hospital management preparing for the celebration of one of these periods should be extremely grateful to predecessors who have preserved the record of progress.

Anniversaries may be commemorated in many ways. Ample historical data; moving pictures; exhibits of hospital scenes at the time of opening; portraits of founders; set-ups of interesting exhibits, such as an operating room of the eighties alongside of an operating room of the present day; pathological laboratories contrasting the two periods; comparative exhibits of old and new equipment; a period exhibit of nurses' uniforms on manikins or dolls, all serve to show the advance in hospital standards.

"Social Hygiene Day" activities will be continued through February in many communities.

In March, 1877, the first visiting nurse started on her rounds.

St. Patrick's Day, March 17, need not be overlooked in writing timely health material.

And then comes Early Diagnosis Campaign, with possibilities in co-operation from most health agencies.

April 1 may prompt reminders of how easy it is to fool oneself in health matters.

FOR REFERENCE AND EDUCATION

"Dry Skim Milk," by Bureau of Home Economics, Dept. of Agriculture, Washington, D. C. *Free*.

Nursing Information Bureau, 50 W. 50 St., New York, N. Y., will send free samples of the following folders:

"Safe Nursing Care" . . . "8-Hour Day" . . . "Wanted: A Real Nurse, an R.N."

"Safety and Sanitation in Institutions of Higher Education," by Dr. James Frederick Rogers, Office of Education. Supt. of Documents, Washington, D. C. *10 cents*.

"The Truth about Cancer." A chapter to a page. Simple, clear. New York State Dept. of Health, Albany, N. Y.

WANTED

A group of graduate students listing health motion pictures and film strips. Send information to Frank J. Mayer, 140 W. Medical Bldg., Ann Arbor, Mich.

A "Guide to Information about Dental Health" is a tentative printed edition, submitted for examination and use test. Intended to carry "in condensed form information of primary importance," the 8 page folder is designed "as an aid to social workers, dental hygienists, school teachers, nurses, and community health workers." If you will join the corps of critics, ask New York Tuberculosis and Health Assn., 386 4th Ave., New York, N. Y., to send you a copy.

BOOKS AND REPORTS

Military Preventive Medicine—
By George C. Dunham, M.D. Carlisle Barracks, Pa.: *Army Medical Bulletin* No. 23, *Medical Field Service School*, 1938. 1198 pp. Price, \$2.50.

The first edition of this book appeared in 1930. The demand for a third edition is a proof of its practical success. It has also met with general favor at the hands of reviewers so that we welcome this new edition which has been revised and brought up to date, and is in every way an admirable book.

The Foreword by the Surgeon General of the Army points out that the military environment shapes the policies of practical sanitation. Measures applicable in the home or in civil communities are often found impracticable in the military service. The difficulties encountered, however, are overbalanced by the opportunity which one has in the military service for the practice of preventive medicine and sanitation and the fact that measures are generally under the control of the officer in charge and can be enforced.

Obsolete material has been deleted. Though it is written from the military standpoint, the underlying principles are the same as in civil practice, and both military and civil officers will find this volume very useful.

The arrangement of the book is excellent and each section is treated adequately. Special attention is given to nutrition. There are good sections on water purification, food control, meat inspection, inspection of poultry, eggs, and fish, dairy and milk plant sanitation, mess sanitation, waste disposal, sewage treatment, etc. It goes without saying that the control of insect-borne diseases is prominent. We owe much

to the officers of the Army for what they have taught us concerning insect-borne diseases. There is also a chapter on Vital Statistics which seems adequate for the purpose. There are six appendices which give the caloric value of human foods, foods which are sources of protein and mineral elements and vitamins, and score cards for dairy farms, pasteurization and milk plants.

The author holds that yaws is quite similar to syphilis, responding positively to the Wassermann and Kahn reactions. He regards alastrim as probably an aberrant form of smallpox.

The book is excellently gotten up and well printed. It is abundantly illustrated with some colored charts, notable among which is one of the reactions of smallpox vaccination which was obtained from the Commissioner of Health of Baltimore, Md. Altogether the book can be recommended unreservedly. The remarkably low price at which it is sold is due to its being an *Army Medical Bulletin* published under the authority of the Secretary of War.

MAZÏCK P. RAVENEL

Introduction To Motherhood—
By Edwin F. Patton, A.B., M.D. South Pasadena, Calif.: *Commercial Textbook Co., Ltd.*, 1938. 137 pp. Price, \$1.50.

It is recognized generally that maternal and infant hygiene depend to a considerable extent upon prenatal care and instruction. Dr. Patton in this little textbook carries the educational process a step or two backward to the adolescent and preadolescent periods where first serious questions are being raised about sex and its relation to motherhood and fatherhood. While this

book is designed to fill a need for suitable instruction in junior and senior high schools, it might well be used, as Dr. Patton suggests, by progressive mothers in introducing their preadolescent daughters to sound ideas of motherhood.

The book is written in an easy colloquial style using words that have an exact meaning. No attempt is made to camouflage the meaning with artistic, dramatic, or puerile phrases. The chapter on "The Child" contains helpful suggestions on child hygiene. Each chapter is followed by a review questionnaire which will assist in fixing the most important points in mind. A glossary of terms completes the text.

RICHARD A. BOLT

Estuary of the River Mersey. *The Effect of the Discharge of Crude Sewage into the Estuary of the River Mersey on the Amount and Hardness of the Deposit in the Estuary. Water Pollution Research Technical Paper No. 7. Department of Scientific and Industrial Research. London, England: His Majesty's Stationery Office, 1938. 337 pp. Price, \$8.00.*

The effect of the discharge of large volumes of untreated sewage on the deposition of solid matter in the Estuary of the River Mersey (England) has been a matter of controversy among the local interests for many years. In 1932, the interested authorities invited the Department of Scientific and Industrial Research to undertake an investigation to determine the effect of such discharges "on the amount and hardness of the deposit in the Estuary." Among other things to which the referring authorities agreed was that "on the issues of scientific facts the results of the investigation should be accepted as conclusive."

The investigation took about 4 years and was necessarily concerned with careful studies of the discharges into

and their distribution within the Estuary; mud sources, composition and deposits; sedimentation rates of mud and mixtures of mud and sewage; the effect of stirring on aggregation and sedimentation; erosion and dredging; and physical changes in estuary channels and banks.

The conclusion of the work and study was that crude sewage discharges had no appreciable effect on the amount and hardness of the deposits in the Estuary.

ARTHUR P. MILLER

A Textbook of Bacteriology—
By Thurman B. Rice, A.M., M.D. (2nd ed.) Philadelphia and London: Saunders, 1938. 563 pp. Price, \$5.00.

This book contains 58 chapters, 5 appendices, an index, but no bibliography. In the preface the author states his feeling that the success of the first edition in two years has demonstrated that the medical student needs a relatively simple text that he may be expected to master in one semester, and revision has aimed merely to bring up to date, clarify, and correct certain passages. A bibliography has been rejected on the premise that students do not read references unless specially assigned by an instructor.

The author has largely omitted theoretical discussions of controversial subjects. The technical processes described in detail are only those which may be carried on by the practising physician, and more complete instructions than is usual in such textbooks are given for taking specimens, sending them to a laboratory, and interpreting the results obtained. The point of view of the author is better understood when it is known that he has been the director of a central state health department laboratory.

It is apparent that the author throughout is writing a reference book for the physician who wishes a short and non-technical review of bacteri-

ology; consequently the book differs greatly from most of the well known textbooks of bacteriology. It is written in a style that might be expected from a physician, author, and teacher who has a penchant for putting scientific facts into popular language. Certainly the presentation is original. While the book seems excellently suited for use by the medical student and the practising physician in the manner that "pleasure reading" is now assigned to pupils in our high schools, its use as a textbook would need to be supplemented by a very complete lecture course.

Morphological descriptions are brief. Bergey's classification is used rather consistently. Technical terms are concisely but, on the whole, rather well defined. There are some inaccuracies in the book. Perhaps too much emphasis is given to disinfection and there is altogether too much use of trade names. The many simple yet illustrative drawings and the somewhat unusual photographs add to the value of the book and differ from those so frequently seen in other textbooks. Many practising physicians would find this book useful for frequent reference.

FRIEND LEE MICKLE

The Bacteriological Examination of Water Supplies. *Report on Public Health and Medical Subjects No. 71. Ministry of Health. London, England: His Majesty's Stationery Office, 1937. 38 pp.*

This monograph was prepared by a committee of eight whose names separately and collectively command the respect of American workers in the field of water bacteriology. The object is to prescribe a standard procedure. The recommended examinations include plate counts at 20°C. and 37°C. and a coli-aerogenes count. Directions are also included for detection of fecal streptococci, *Cl. welchii* and bacteria of

the typhoid-paratyphoid group. While much of the technic differs little from that in use in the United States, the recommended media for the 37°C. plate count and for the coliform group are those of MacConkey. The essential difference is in the use of commercial sodium taurocholate in place of meat extract.

Appendices contain details in regard to sampling, apparatus, the preparation of media and reagents, and McCrady's table for the probable number of coliform organisms present in water.

The monograph includes a very concise and excellent statement of the interpretation of the laboratory results with which it is believed that most American workers would heartily agree.

JOHN F. NORTON

A General Textbook of Nursing
—By Evelyn C. Pearce. New York: Dutton, 1938. 888 pp. Price, \$3.75.

The author has again written from her broad personal experience in the care of the sick and in the teaching of nurses. While the book is entitled "A General Textbook of Nursing," it is planned as a comprehensive guide and it is just that. The volume is divided into six sections, presenting: (1) General and Special Nursing Measures and Procedures; (2) The Feeding of Adult Patients and Infants and Elementary Dietetics; (3) The Administration of Drugs and Medicines and Elementary Materia Medica, Poisons and Poisoning; (4) Medical Conditions and Diseases and their Treatment and Nursing; (5) Gynecological Conditions and Their Treatment and Nursing Care, Venereal Disease, A Short Account of Pregnancy; (6) Surgical Nursing and Elementary Surgical Technique.

While nursing procedures must vary according to the practices of the chiefs of staffs and hospital routines, Miss Pearce presents those phases of nursing care which are fundamental and prac-

tical and are particularly helpful to the inexperienced nurse in stating what she may expect to find, how the patients may react, and what is the nurse's responsibility.

The volume is richly illustrated with carefully marked photographs and drawings. The appendix gives some examples of the type of questions used in the final "state examinations" of the last few years and this, no doubt, indicates one of the chief uses for which the book was written. Throughout this very comprehensive presentation one has the conviction that the patient's comfort and recovery are always foremost in the nurse's mind and practice.

While this volume does not easily lend itself for use as a textbook, it is recommended as a reference book for schools of nursing libraries and for nurses in general practice who do not have good library facilities.

MARION G. HOWELL

A Textbook of Biochemistry—
By Roger J. Williams, Ph.D., D.Sc.
New York: Van Nostrand, 1938. 525 pp. Price, \$6.00.

Dr. Williams has written a short textbook of biochemistry, which presents the material in a manner somewhat different from most texts which have appeared recently. The order of presentation of the subject is obviously responsible for the novel features.

The book is divided into five parts. The first three sections concern respectively Biochemical Materials (largely colloid and organic chemistry, presented briefly), Tissue Composition and Food Composition. The last two which may be considered as the physiological applications, are respectively Bodily Mechanisms for Regulating Chemical Change, and Metabolism.

This is not a completely new method of approach. About 15 years ago, before medical students were advised to receive didactic instruction in elemen-

tary organic and physical chemistry in their pre-medical training, it was the favorite method of presenting the subject with some teachers. The duration of the course in biochemistry in medical schools was somewhat longer under those circumstances than it is now. At present it appears desirable to spend by far the larger proportion of time upon the physiological applications of chemistry.

The reviewer believes that the text, which is a worthy one, will have greater usefulness for courses in biochemistry designed for other than medical students.

D. L. DRABKIN

Nurses Handbook of Obstetrics
—By Louise Zabriskie, R.N. (5th ed.)
Philadelphia: Lippincott, 1937. 724 pp. Price, \$3.00.

The fifth edition of Miss Zabriskie's Handbook measures up to all expectations derived from the previous editions. It is difficult to conceive of a more comprehensive or complete guide for nurses in this important field. The selection and arrangement of material, the excellent illustrations, the handy glossary, references, and complete index, make it a valuable reference volume. Especial attention has been given to the photographic illustrations.

The public health implications of good obstetrics have not been overlooked. A chapter is devoted to antenatal care which includes not only the part played by the medical attendant but also the nurse's share in suitable instruction through personal conference and well organized classes for group instruction of prospective mothers and fathers. The chapter on Motherhood and Human Welfare is timely in view of the developments taking place in governmental extension of maternal and child hygiene. A brief chapter on the History of Obstetrics adds to the value of the Handbook.

RICHARD A. BOLT

Tuberculosis Clinic Manual—A Report of the Committee on Clinic Standards. By Herbert R. Edwards, M.D., Chairman. New York: National Tuberculosis Association, 1938. 57 pp. Price, \$.50.

In this small volume the Committee on Clinic Standards of the National Tuberculosis Association has put into concise form the component parts of desirable tuberculosis clinic practice as it is understood in progressive tuberculosis work in this country. Beginning with a historical introduction, the committee has defined, in the modern sense, the function and service of the clinic. It has discussed relationships with other agencies, responsibility, budgetary items, physical arrangement of the clinic quarters, the admission of patients, their records, standards of personnel, scope of medical services and clinic procedures, educational activities relating to clinic work, case finding methods, and standards of tuberculosis service.

Especially interesting are the short chapters on Responsible Agency, Relationships with Other Agencies, and Educational Activities. According to the committee "The voluntary agency has contributed much to the development of clinic services in this country. It is its responsibility to initiate and demonstrate clinic service in a community without such facilities, or even to supplement existing clinics by additional facilities in new areas. It is likewise the responsibility of the voluntary agency to bend every effort to cause the official agency to assume responsibility for such clinic service as soon as possible."

More extensive affiliation with medical schools is urged, it being pointed out that less than one-half of the 77 recognized medical schools in the United States in 1936 had an affiliation with a chest clinic.

The chapter on relationships with

other units of community health and welfare work discusses coöperation and correlation of clinic service with the private practitioner, the hospital and sanatorium, the relief agency, and the local nursing agency.

A comprehensive account is given on the management of clinic records and on the scope of medical services and clinic procedures. Diagnosis and supervision of the case have a prominent part in the description of service in the clinic.

The volume contains a bibliography of selected references on tuberculosis dispensaries. An appendix on the arrangement of clinic space includes two diagrams showing, respectively, the layout of a chest service in a health center building in New York City, and the layout of space in a store or loft adapted for clinic use.

This excellent manual may be used to great advantage in setting up a new clinic and in evaluating existing tuberculosis clinic services. Although the committee concludes that "such standards of practice as we may devise are at best suggestive and are bound to be altered by the varying circumstances met in an individual community," clinic chiefs and their coworkers will find this volume extremely useful. Witnessing the greater emphasis on the refinement of case finding methods in the tuberculosis program, tuberculosis workers everywhere should become acquainted with this comprehensive report.

BERNARD S. COLEMAN

The Road To Safety Series—By Horace Mann Buckley, Margaret L. White, Alice B. Adams, and Leslie R. Silvernale. New York: American Book Co., 1938.

The Series includes eight volumes, as follows: *Away We Go*, 56 pp., price \$.20; *Happy Times*, 137 pp., price \$.56; *In Storm and Sunshine*, 152 pp., price \$.64; *In Town and Country*, 216

pp., price \$.72; *Here and There*, 285 pp., price \$.72; *Around the Year*, 346 pp., price \$.76; *On Land and Water*, 357 pp., price \$.80; *Who Travels There?* 440 pp., price \$.88.

This is a series of 8 volumes dealing with the subject of safety. They range from a small paper covered booklet called "Away We Go" intended for the use of the child just entering school to the more imposing book of 440 pages for the older child and called "Who Travels There?" The vocabularies are graded of course to fit the various age levels; there are word lists and the illustrations are profuse and attractive.

Glancing over the various volumes one sees that about every conceivable situation which may menace life and limb is treated by means of illustrative stories (interesting ones, too or simple, well written articles. Several of the books contain a list of safety habits and attitudes with references to the pages illustrating them.

It would seem to this reviewer that every boy and girl might find in this series of books most everything needed about the dangers which beset even the wariest individual in this complicated life we must lead; and that the teacher will find here ample material for use in safety instruction.

MERRILL E. CHAMPION

Manual for Dental Technicians. Vulcanite—By J. A. Salzmann, D.D.S. New York: Pitman Publishing Corp., 1938. 346 pp. Price, \$4.00.

This is a valuable addition to the library for dental laboratory workers. The entire field of vulcanite denture construction is covered in a manner even more determined than that pursued in the prosthetic laboratories of dental schools.

The training of technicians has usually been by the apprentice method or in commercial schools of doubtful merit. While dental education has

been brought to a high level under the auspices of universities and the American Dental Association, the formal training of technicians has been neglected, hence this *Manual* would seem to fill a long felt want. It is interesting to note that courses of instruction in this field are now offered in vocational high schools of New York City.

There are a few errors, such as the transposition of figures 32 and 33 on page 26. Illustrations are numerous and helpful. The binding will stand a good deal of the rough treatment a laboratory manual must endure. The printing, arrangement of material, and make-up are of the best, and the book can be unreservedly recommended.

C. F. ELZEA

Office International D'Hygiene Publique, *Monthly Bulletin*, September, 1938.

This number is of great interest as again showing the increasing recognition of the constantly growing importance of the airplane as a possible carrier of infection.

It contains reports on the index of the *Aedes aegypti* in the various parts of Africa, a larval index in the centers of the Côte de l'Or, of Nigeria, and index of the *Aedes aegypti* in Kenya; also the distribution and incidence of the *Aedes aegypti* in the Anglo-egyptien Soudan, all by well known experts. There is a description of the sanitary provisions of the Aerodrome of Lokandu (Congo belge); also articles on the precautions taken in flights of airplanes from the standpoint of carrying yellow fever, and the automatic destruction of mosquitoes in airplanes in Africa.

From America we have articles on the organization of anti-yellow fever vaccination for the personnel of the airplane companies, and among the officers of the Public Health Service of the United States; immunization of

the operatives of the air lines against yellow fever; and a report on the hiding places of mosquitoes in airplanes.

All of these articles are useful and interesting. The article by Dr. Ross, the Chief Medical Officer of Health in the Department of Hygiene in the Union of South Africa, gives a complete exposition of the dangers of carrying yellow fever in South Africa by aerial navigation. One cannot but be amused at his statement that an "almost despairing" (*presque désespérée*) note is contained in a recent American report which held that it was almost certain that sooner or later infected passengers will reach by means of airplanes cities infected by *Aedes aegypti* in the southern part of the United States. It points out also that in the United States we no longer harbor the illusion of freeing the country entirely of the Aedes and are now devoting most attention to developing efficient means of ridding airplanes and airports of this mosquito.

MAZÛCK P. RAVENEL

Manual of Psychiatry and Mental Hygiene—By Aaron J. Rosanoff, M.D. (7th ed.) New York: Wiley, 1938. 1,091 pp. Price, \$7.50.

Dr. Rosanoff's book is rewritten and enlarged in an attempt to bring the manual up to date. It is a diligent work with generous excerpts from other authors and research men in the field—in fact sometimes too voluminous to preserve congruity. In presenting his subject, the author's view is one that regards psychiatry as psychobiological reactions of the individual to his environment. It is somewhat regrettable that this fact, together with his own work and interest, restricts his scope and confines his survey of literature mostly to those topics in which he himself is most interested or engaged. In such a complex and diversified field of psychiatry, this method limits the ob-

jective representation of facts known and aimed at, and impairs the thoroughness of the book, when names and works as divergent as those of Kretschmer and Jung are entirely omitted.

The chapter on Chaotic Sexuality is rather arbitrary with inclusion of some of the so-called schizophrenic psychoses. His division of schizophrenia into five etiological entities lacks justifiable foundation. The review of psychoanalysis is rather inadequate without depth and critical evaluation. The author's comments are mostly introductory, presenting Freud in the latter's own very abbreviated paragraphs, faced with excerpts of H. T. Hyman's solitary article, "The Value of Psychoanalysis as a Psychotherapeutic Procedure," published in the *Journal of the American Medical Association* in 1933.

"Today no individual worker can write a textbook of psychiatry on the basis of his own experience alone, no matter how extensive that experience might be," writes Dr. Rosanoff. He might have done better to invite as co-authors for individual chapters in his work some of those on whose works part of his manual is based, with him acting as a coördinator and editor, moulding the parts to shape and form to give to medical students a more lucid, impartial and adequate presentation of the state and problems of psychiatry.

RALPH S. BANAY

Maternal Care Complications—By F. L. Adair, M.D., Editor. Chicago: University of Chicago Press, 1938. 95 pp. Price, cloth \$1.00, paper \$.50.

Dr. Adair and his associates have brought together the essentials in the prevention of the most important complications of pregnancy; namely the toxemias of pregnancy, obstetric hemorrhages, and puerperal infection. The same technics advised for the prevention of these complications will undoubtedly reduce the incidence of the

lesser complications and diminish the morbidity as well as the mortality.

Each chapter is devoted to one of the complications and takes up systematically the etiology, pathology, symptoms, diagnosis, and treatment. The preventability in each instance is stressed. In referring to puerperal infection, the leading cause of puerperal mortality, the authors state: "the disease is almost completely preventable in properly conducted obstetric cases."

The authors recognize the value of suitable instruction of the prospective

mother as stated in the following: "Women must be properly instructed in personal care and must be taught to coöperate with and appreciate the doctor who is trying to give good antepartum and delivery care. Failure of proper lay coöperation is responsible for about 50 per cent of the preventable deaths among mothers."

While the authors recognize that the problem of reducing maternal mortality is complex, they have nevertheless indicated in this little volume the fundamental factors. RICHARD A. BOLT

BOOKS RECEIVED

DISEASES OF THE SKIN. By George Clinton Andrews. 2d ed. Philadelphia: Saunders, 1938. 899 pp. Price, \$10.00.

MANUAL OF PUBLIC HEALTH HYGIENE. By J. R. Currie. Baltimore: Wood, 1938. 324 pp. Price, \$5.00.

AVIAN TUBERCULOSIS INFECTIONS. By William H. Feldman. Baltimore: Williams & Wilkins, 1938. 483 pp. Price, \$7.00.

NAZI GERMANY: ITS WOMEN AND FAMILY LIFE. By Clifford Kirkpatrick. Indianapolis: Bobbs Merrill, 1938. 353 pp. Price, \$3.00.

NUTRITION: THE NEWER DIAGNOSTIC METHODS. Proceedings of the Round Table on Nutrition and Public Health, Sixteenth Annual Conference of the Milbank Memorial Fund, March 29-31, 1938. New York: Milbank Memorial Fund, 1938. 192 pp. Price, \$1.00.

FACTS ABOUT FOOD. By S. Henning Belfrage. New York: Oxford, 1938. 177 pp. Price, \$1.50.

MEDICAL INFORMATION FOR SOCIAL WORKERS. By William M. Champion. Baltimore: Wood, 1938. 529 pp. Price, \$4.00.

BABY CARE. By May E. Law. Philadelphia:

Lippincott, 1939. Thirteen booklets. Price, \$2.00.

THE FIELD UNIT IN LOCAL PUBLIC HEALTH SERVICE. Tennessee and Mississippi, 1930-1937. By Harry E. Hanley. New York: Commonwealth Fund, 1938. 50 pp. Price, \$25.

YOUR COMMUNITY. ITS PROVISION FOR HEALTH, EDUCATION, SAFETY, AND WELFARE. By Joanna C. Colcord. New York: Russell Sage, 1939. 249 pp. Price, \$.85.

VETERINARY HELMINTHOLOGY AND ENTOMOLOGY. The Diseases of Domesticated Animals Caused by Helminth and Arthropod Parasites. By H. O. Mönnig. 2d ed. Baltimore: Wood, 1938. 409 pp. Price, \$9.00.

IMMUNITY. PRINCIPLES AND APPLICATION IN MEDICINE AND PUBLIC HEALTH. By Hans Zinsser, John F. Enders and LeRoy D. Fothergill. 5th edition of "Resistance to Infectious Diseases." New York: Macmillan, 1939. 801 pp. Price, \$6.50.

THE CHEMISTRY OF NATURAL IMMUNITY. By William Frederick Koche. Boston: Christopher Publishing House, 1938. 199 pp. Price, \$2.00.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

In the Interest of Patience—Sanitarians who are tempted to be impatient with progress hereabouts will do well to look up this editorial account of the recent British milk bill, which treats pasteurization as if it were a dangerous experiment. Under the proposed law's "revolutionary" provisions, a local health authority *may* apply to the Minister of Health for an order which will permit him to require certain kinds of milk to be pasteurized, but there must be a public inquiry in each instance, and the loopholes that the law creates are big enough to allow all the milk carts in England to be driven through. Considering the reported sanitary condition of much of the English milk, the yeomanry of those tight little Isles seem in no danger of being deprived of their daily allotment of milk-carried germs.

ANON. Half-Hearted Pasteurization. *Lancet*. 2, 23:1304 (Dec. 3), 1938.

Important Committee Report—Here, along with what is known, are listed a few of the researches that should be carried on to give us some needed supplementary information about cancer. The amount of work to be done seems appalling.

ANON. Fundamental Cancer Research. *Pub. Health Rep.* 53, 48:2121 (Dec. 2), 1938.

About Mental Health—Two brief but stimulating papers upon a subject with which many health workers are woefully uninformed. As this reviewer is about the "woofullest," this annotation must be limited to the comment

that both seem well worth serious study.

HOULOSE, J. Contribution of Mental Hygiene to Education on the Elementary Level, and:

ANDERSON, F. N. Some Physiologic Concepts in Mental Hygiene. *J.A.M.A.* 111, 27:2447 (Dec. 31), 1938.

Idea's Germ—Here is a discussion device which is worthy of the consideration of public health educators and other health workers. The subtitles tell the significant story: "As it is—as it should be—on the elementary school level; as it is—as it should be—on the junior high school level; as it is—as it should be—on senior high school level."

BURKHARDT, C. H., *et al.* A Symposium on Physical Education. *J. Health & Phys. Ed.* 9, 10:608 (Dec.), 1938.

Summer Camps, Open Air Schools, etc.—How complete has been the change in our beliefs about tuberculosis during the last dozen years is told in a few paragraphs by this author, who proceeds to pull the shaky props from under some ineffective, but emotionally satisfying so-called antituberculosis projects that, the author hints, have handicapped the real work for a generation.

BUSH, C. Tuberculosis among Children of School Age. *J. School Health.* 8, 9:267 (Nov.), 1938.

May School Children Spread Tuberculosis?—Primary tuberculosis infection in children runs a course comparable to other acute infections though usually with unrecognized signs. About

10 per cent of cases of childhood infection will become ill with tuberculosis in adult years after reinfection. Children with first infection disease are a danger to their playmates for only the first few months, and then not seriously so, and special treatment is not needed for primary infection. Avoidance of contact is the only preventive.

HILL, L. F. Some Present Concepts of Tuberculosis among Infants and Children. *J. School Health.* 8, 9:249 (Nov.), 1938.

Modifying Measles—Convalescent serum given to measles patients after Koplick spots had appeared, but while in the preëruptive stage, definitely modified the disease in about 5 cases out of 6. Normal adult serum did not help. This therapy is recommended for debilitated children, those recently recovered from whooping cough, or those with a chronic disease.

KÖHN, J. L., *et al.* Treatment of Pre-eruptive Measles with Convalescent Serum. *J.A.M.A.* 111, 26:2361 (Dec. 24), 1938.

Why Scientific Answers Are Hard to Get—In New York City a group of 1,830 children of tuberculous parents have been kept under supervision, 880 of whom had received BCG. They were visited monthly by nurses and at frequent intervals by pediatricians, and an attempt was made to see that all received the same care. This paper has to do with the considerations that might affect the result, such as selection of cases for treatment and control, risk of heavy infection, race, reliability of diagnoses at death, etc. The results are not given in this paper, for the data are as yet insufficient for judgment.

LEVINE, M. L., *et al.* Immunization against Tuberculosis. *Am. Rev. Tuberc.* 37, 5:632 (Nov.), 1938.

Negro Diets—Health workers who write learned articles on good nutrition

will be interested in this account of what negroes in Harlem actually eat. Flour, rice, and potatoes are the usual fare. Fresh vegetables and fruit are rare, but milk is the food most neglected. It is regarded as a dainty.

OPPENHEIM, D. A. An Inquiry into the Dietary of a Negro Group. *Woman's Med. J.* 45, 12:360 (Dec.), 1938.

Facts about Germs You Probably Never Knew—Soap and water scrubbing removes germs from the skin at a constant logarithmic rate of roughly half in 6 minutes. Theoretically it would require 2½ hours of continuous scrubbing to sterilize the skin. There is here a great deal of important information about transient and resident bacteria and other general facts that clinicians, public health nurses, and technicians especially should know.

PRICE, P. B. The Bacteriology of Normal Skin; A New Quantitative Test Applied to a Study of Bacterial Flora and the Disinfectant Action of Mechanical Cleansing. *J. Infect. Dis.* 63, 3:301 (Nov.-Dec.), 1938 (or) PRICE, P. B. New Studies in Surgical Bacteriology and Surgical Technic. *J.A.M.A.* 111, 22:1993 (Nov. 26), 1938.

Fear, Anxiety, Ignorance, and Childbirth—Why women worry during the antenatal period and what worry does to childbirth is told to a British Association of Midwife Supervisors. Mental hygiene is an important aspect of prenatal care.

READ, G. D. Antenatal Care of the Emotions. *Health Officer.* 3, 7-8:184 (Nov.-Dec.), 1938.

Pneumonia Prevention—Although treatment with the capsular substance of pneumococci will render the individual partially immune to infection, and although vaccination is a practical procedure in camps and institutions where men are in close contact, especially in the face of institutional epidemics, this method of protection

does not seem feasible as a public preventive measure, because the general incidence of the disease is so low. Treatment is justified for groups in which the risk is high. Education to urge precautions by those with colds, and efforts to prevent overcrowding are worth while public measures, for pneumonias are transmitted by carriers through close personal contact.

SMILLIE, W. G. The Prevention of Pneumonia. *New York State J. Med.* 38, 23: 1485 (Dec. 1), 1938.

Where To Go for Board Members
—Kiwanis clubs' support of community health projects are reviewed for the benefit of the (health administrator) "feller that needs a friend."

SUTTON, W. M. Public Health Programs in Kiwanis. *Pub. Health Nurs.* 30, 12:693 (Dec.), 1938.

Why Epidemics Spread—Old and favorite is the epidemiologic theory that disease outbreaks are produced by the increase in virulence of the causative organism, and that the epidemics end when most of the susceptibles are dead or recovered and the organism returns

to its former state of virulence. Some animal experiments are reported upon, which indicate that when susceptible races become infected, nearly all succumb, when immune types meet the same hazard, they are immune, and that in mixed populations, the severity of the epidemic depends upon the proportion of susceptibles, and with few exceptions they are the only ones involved. Mice are not men, but experimentally developed theories fit human epidemiology better than the older belief in an enhanced virulence of the germ. A stimulating paper.

WEBSTER, L. T. Inborn Resistance to Infectious Disease. *Sci. Month.* 48, 1:69 (Jan.), 1939.

Brass Tacks and Syphilis—Here is real meat. Some venereal disease social workers discuss the technics of dealing with venereal disease contacts and how to get them to be examined. A page of this is worth chapters of theorizing about venereal disease control.

WOODS, H. E., *et al.* The Syphilitic Patient and His Contacts. *Pub. Health News* (New Jersey State Dept. of Health). 22, 6:386 (Dec.), 1938.

ASSOCIATION NEWS

SIXTY-EIGHTH ANNUAL MEETING

Pittsburgh, Pa.

October 17-20, 1939

HEADQUARTERS — HOTEL WILLIAM PENN

OFFICERS AND EXECUTIVE COMMITTEE

PITTSBURGH ANNUAL MEETING

DR. I. Hope Alexander, Chairman of the Local Committee for the Sixty-eighth Annual Meeting of the Association in Pittsburgh, Pa., October 17-20, announces the following Committee appointments:

- I. Hope Alexander, M.D.....Chairman
Director, Department of Public Health
- W. W. McFarland, M.D.....Co-Chairman
Executive Director, General Health Council
- H. B. Meller, Sc.D.....Vice-Chairman
Bureau Chief, Bureau of Smoke Regulation
- H. F. Smyth, Jr., Ph.D.....Secretary
Mellon Institute of Industrial Research
- P. E. Marks, M.D.....Treasurer
Superintendent, Bureau of Infectious Diseases

Chairmen

- John R. Conover, M.D.....Finance Committee
Frick Building
- H. T. Price, M.D., President-elect.....Reception Committee
Allegheny County Medical Society
- L. W. Bass, Ph.D., Assistant Director.....Publicity and Radio Committee
Mellon Institute of Industrial Research
- H. J. Benz, M.D., Superintendent.....Meeting Rooms Committee
Bureau of Child Welfare
- Mrs. P. Burgin Digby, President.....Registration Committee
Pennsylvania Parent-Teacher Association
- L. M. Sandston, Superintendent-Engineer.....Scientific Trips Committee
Bureau of Sanitation
- S. R. Haythorn, M.D.....Entertainment Committee
Singer Memorial Laboratory, Allegheny
General Hospital
- Mrs. David B. Ludwig, President.....Ladies Entertainment Committee
Women's Auxiliary of Allegheny County
Medical Society
- C. Howard Marcy, M.D., Medical Director.....Membership and Attendance Committee
Tuberculosis League Hospital
- Howard Patton, Superintendent.....Transportation Committee
Bureau of Food Inspection

REPORT FROM THE COMMITTEE OF THE AMERICAN PUBLIC HEALTH ASSOCIATION APPOINTED TO
CONFER WITH THE INTERDEPARTMENTAL COMMITTEE TO COÖRDINATE HEALTH AND
WELFARE ACTIVITIES AND WITH OTHER AGENCIES, AS ADOPTED
BY THE GOVERNING COUNCIL.

THE committee met in Washington, D. C., on November 19, 1938, at the request of Miss Josephine Roche, Chairman of the Interdepartmental Committee, for an extended conference.

All members were present, including Abel Wolman, Dr. Eng., *Chairman*, J. N. Baker, M.D., Louis I. Dublin, Ph.D., A. T. McCormack, M.D., H. S. Mustard, M.D., J. L. Rice, M.D., F. J. Underwood, M.D., and, *ex-officio*, E. S. Godfrey, Jr., M.D., and Reginald M. Atwater, M.D.

The National Health Program was discussed from many angles but with particular reference to its bearing on the work of the public health profession and in accordance with the terms of reference of the Association Resolution dated October 27, 1938, to the end that the principles of the National Health Program may be translated promptly into effective action.

Without attempting to include all aspects of the matters discussed, the committee of the American Public Health Association presents the following statement of certain fundamental policies which it recommends to the Association for adoption as representing the considered judgment of this professional society of public health workers.

These recommendations, we believe, agree in most points substantially with the proposals of the Interdepartmental and Technical Committees on the federal-state relationships embodied in the National Health Program, and we agree that the primary federal function is to give financial and technical aid to the states for carrying out approved programs.

1. It is certainly theoretically desirable that a single state agency should be made administratively responsible for carrying out all the provisions of the National Health

Program which may be enacted into law. In recommending that this single agency should be the state department of health, we recognize that the present patterns in most states do not conform to this proposal, yet we note evidence that organized medicine and many public welfare officials share our opinion that at least ultimately the state health department should be the responsible agency. We believe that there are many affirmative reasons why the state health department is the best agency at the state level for this purpose. No agency will be able so readily or effectively as the health department to provide professionally qualified personnel and be so readily or effectively able to maintain high professional standards of medical care.

In recommending that the state health department should be the primary integrating and coördinating unit, we recognize that the counsel of qualified advisers from the medical, dental, nursing, hospital, and ancillary professions will be requisite, that adequate provisions for technical staffs and administrative expense will have to be made from the outset, and that increased funds for training purposes will be essential for successful performance. We have concluded further that, however reluctant medical health officers may be at present to take over these added responsibilities, a study of the alternative choices for such purposes will be determinative. This basic recommendation does not preclude a working arrangement in some states with existing machinery outside of the official health department which might function well through another channel, provided that the state health officer retains supervisory control over the broad plans and the general purposes of the funds which the state may receive. It is further recommended that in such plans due consideration will be given to the allocation of funds by a state department of health to the various substantial governmental jurisdictions within a state where population, extent of the special problems, or financial need justify.

We note that this proposal is in accord with the recommendation of the Interdepartmental Committee that this program should be developed around and be based upon existing preventive health services.

2. The committee reaffirms and reemphasizes the official declaration of the American Public Health Association that, in the initiation and development of the program, wide latitude should be given to the states in the definition of the population to be served, in the selection of the method of providing medical service, and in other important phases of the proposed program. We believe that similar latitude should be provided with regard to the method of raising funds in the states to accomplish approved objectives.
3. The committee finds itself in agreement with the recommendations in the National Health Program that the fundamental objectives involved here are, first, conservation of health and vitality and, second, reduction of the rôle of sickness as a cause of poverty and dependency. With this in mind, it supports the concept that Recommendations 1, 2, and 3 of the Interdepartmental Committee (the expansion of public health and maternal and child health services, the expansion of hospital, clinic, and other institutional facilities, and the provision of medical care for the medically needy) should have priority in initiation.
4. We believe that recent experience demonstrates that the Social Security Act provisions for aid to the states for health work provide a suitable framework for the expansion of preventive health services.
5. We submit that it is essential that any state program to be approved for federal aid should contain adequate provisions for the maintenance of high personnel standards and that payment of such federal aid to state agencies should be withheld when it is found that substandard services are being furnished. Similar policy should obtain with respect to state aid to local areas within a state. The appropriate federal administrative authorities should have power to establish minimum standards through rule and regulation after consultation with competent advisory professional bodies.
6. Careful study will be necessary to perfect administrative regulations to cover the details concerned with the provision of medical services, so as to assure a high level of quality. We believe that standards of medical practice should not be written into basic law. Federal aid should be conditioned on inclusion within the state plans of adequate safeguards for maintaining appropriate standards.
7. We believe that the extension and improvement of public health services in general throughout the country requires complete integration of health services of the federal government under one cabinet officer, preferably a Secretary of Health.

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

William S. Bailey, 31 Glorieux St., Irvington, N. J., Health Officer
 Donald G. Barton, M.D., City Hall, Concord, N. H., Sanitary Officer, Dept. of Health
 Herman Baxt, M.D., Riker's Island, N. Y., Chief Medical Officer, Riker's Island Penitentiary and Hospital
 Joe M. Chisolm, M.D., Newport, Tenn., Cocke County Health Officer
 Richard R. Foster, Soule Bldg., New Orleans, La., Director, Dept. of Public Welfare
 Maurice Gore, M.D., 51 Fox St., Aurora, Ill., District State Health Superintendent
 Andrew R. Johnson, Jr., State Capitol Bldg., Baton Rouge, La., Director, State Hospital Board
 Edna C. Keefer, 26 Cherry St., Milford, Conn., Assistant to Health Officer
 Irvin Kerlan, M.D., Boyd County Health Dept., Ashland, Ky., Assistant Director

George E. Mueller, M.D., 1011 Lake St., Oak Park, Ill., Commissioner of Health
 Theodore R. Shrop, M.D., 1224 Washtenaw Ave., Ann Arbor, Mich., Chief, Division of Child Hygiene, Akron Health Dept. (Ohio) (Student at present)
 Charles A. Steurer, M.D., Central Drive, Port Washington, L. I., N. Y., Director, Division of Communicable Diseases, Nassau County Dept. of Health

Laboratory Section

Guy G. Frary, State Chemical Laboratory, Vermillion, S. D., State Chemist
 Ruth B. Glass, Capitol Bldg., Little Rock, Ark., Bacteriologist, State Board of Health
 Ervin W. Hopkins, Ph.D., Armour & Co., Chemical Research Lab., Chicago, Ill., Research Bacteriologist
 Richard J. Lebowich, M.D., 12 S. Park Drive, Gloversville, N. Y., Director, Fulton County Laboratory

Willard H. Rhodes, 933 Orizaba Ave., Long Beach, Calif., Student

Bennett Sallman, 510 N. State St., Ann Arbor, Mich., Student

Leonard O. Vose, 1017 State Capitol, Lincoln, Nebr., Director of Laboratories, State Dept. of Health

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John N. Wilson, State Board of Health, Minneapolis, Minn., Assistant Biologist, Division of Sanitation

Vital Statistics Section

Erminie J. Cross, 231 E. 54 St., New York, N. Y., Statistical Secretary, Division of Health Studies, Commonwealth Fund

John D. B. Scott, Parliament Bldgs., Victoria, B. C., Canada, Statistician, Provincial Board of Health

Frances Sisselman, 570 Bradford St., Brooklyn, N. Y., Volunteer Worker, Henry Street Visiting Nurse Assn.

Irving V. Sollins, Ph.D., U. S. Public Health Service, Washington, D. C., Associate Statistician

Public Health Engineering Section

Henry M. Chick, District Bldg., Washington, D. C., Junior Public Health Engineer, Health Dept.

James J. Dillon, 335 State Office Bldg., Providence, R. I., Sanitary Engineer, State Dept. of Public Health

Albert M. Eldridge, Bartow County Health Dept., Cartersville, Ga., Sanitary Engineer

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Robert H. Gregory, Jr., Valley Health District, Luray, Va., Sanitarian, State Health Dept.

Carl D. Gross, State Health Dept., Springfield, Ill., Assistant Sanitary Engineer

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Marion C. Henderson, U. S. Dept. of Labor, Children's Bureau, Washington, D. C., Associate Statistician, Division of Statistical Research

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Public Health Nursing Section

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Ina M. Collins, R.N., Harrisonville, Mo., Public Health Nurse, State Board of Health
Margaret Donnen, County Health Dept., Camden, S. C., County Nurse

Olive H. Harr, 520 S. Forest, Ann Arbor, Mich., Student

Mary A. Johnson, 424 S. E. Harvard St., Minneapolis, Minn., Field Advisory Nurse, State Dept. of Health

Mabel Madden, 118 E. 91 St., New York, N. Y., Supervisor, Henry Street Visiting Nurse Service

Frances T. McDougal, R.N., Celery Ave., Box 62, Sanford, Fla., Seminole County Nurse
Aurora S. Nelson, Hill City, Kans., Public

Health Nurse, State Board of Health
Grace L. Westrope, R.N., 424 N. W. 6 St., Oklahoma City, Okla., Directing Field Nurse, Oklahoma Commission for Crippled Children

Mary L. Williams, R.N., 1317 Dreiss, Fort Worth, Tex., Tarrant County Public Health Nurse

Epidemiology Section

Malcolm H. Merrill, M.D., State Bldg., San Francisco, Calif., Chief, Bureau of Venereal Diseases, State Dept. of Public Health

Herman M. Soloway, M.D., 300½ S. Second St., Springfield, Ill., Venereal Disease Control Officer, State Dept. of Public Health

Unaffiliated

Meleta M. Harmon, 2700 W. Chicago Blvd., Detroit, Mich., Biology and Physiology Teacher, Central High School

David M. Heyman, 61 Broadway, New York, N. Y., Member, New York Board of Health

Milton C. Winternitz, M.D., 310 Cedar St., New Haven, Conn.

ANTHRAX REPORT AVAILABLE

AT the Kansas City Annual Meeting there was presented before the Industrial Hygiene Section a comprehensive report on "Anthrax in Industry," fully documented by Dr. Henry Field Smyth of Philadelphia.

In view of the limited scope of the Association Year Book, this report has been reproduced by the U. S. Public Health Service, and J. J. Bloomfield, Chairman of the Industrial Hygiene Section, announces that copies may be

obtained from the Division of Industrial Hygiene, National Institute of Health, Washington, D. C.

ROYAL SANITARY INSTITUTE

THE Royal Sanitary Institute of Great Britain will meet in Scarborough, England, July 3-8, 1939.

Fellows of the Association who expect to be in England during this period are requested to notify the Executive Secretary of the A.P.H.A., 50 West 50th Street, New York, N. Y.

Letter to the Editor

To the Editor:

In your November issue, on page 1356, is a notice of the paper by J. Yerushalmy entitled "Neonatal Mortality by Order of Birth and Age of Parents," which ends with the sentence: "Conclusion jumpers will find this article much to their liking." Being already acquainted with Mr. Yerushalmy's strictly scientific paper, which

is certainly of importance, I was dismayed to read this comment. May I urge your readers to consult the original and assure themselves that the author has sedulously avoided jumping to conclusions.

Very truly yours,

J. ROSSLYN EARP, DR.P.H.

December 30, 1938.

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge.

Replies to these advertisements, indicating clearly the key number on the envelope, should be addressed to the American Public Health Association, 50 W. 50 Street, New York, N. Y.

POSITIONS WANTED

HEALTH OFFICERS

Experienced physician, administrator, epidemiologist and teacher, now employed, with C.P.H. from Johns Hopkins, and 14 years' public health background, will consider position. Prefers epidemiology in city or state department. Excellent references. A355

Well qualified physician, with C.P.H. from Johns Hopkins; experienced as school physician and in college teaching, will consider city or county administrative position or teaching and student health service. A383

Physician, M.D., Class A medical school; M.P.H., Harvard School of Public Health; extensive experience in pediatrics and school medical services; also background of county health administration and teaching in medical school, will consider expanded opportunity in teaching or research. A302

Physician, M.D., Columbia, experienced as county health officer and superintendent of health, seeks position in public health administration or medical executive work. A396

Physician, M.D., Vanderbilt University; Dr.P.H., Johns Hopkins; experienced as epidemiologist, health officer and professor of preventive medicine, seeks position as administrator or epidemiologist. A397

Physician, 30 years of age, M.D., University of Illinois; C.P.H., University of California; experienced as instructor in medicine and director of state Division of Epidemiology, desires position in communicable disease control or administration. A399

Physician with M.P.H. from Harvard, experienced as epidemiologist and in county health administration, also in communicable diseases at state level, seeks responsible position. A392

Physician, M.D., McGill; C.P.H., Johns Hopkins; excellent background of communicable disease control and school health service, seeks position as epidemiologist or public health administrator. A368

HEALTH EDUCATION

Young woman, experienced teacher in health education, with M.S. in Public Health and Hygiene from University of Michigan, seeks position as health coordinator. H398

Young man, M.S.P.H., University of Michigan; at present college teacher of hygiene and physical education, and experienced in university medical service, desires position as executive in public or private health organization. H357

Young woman, M.A., Health Education, Teachers College, Columbia University; with splendid international experience, seeks position as director of health education. H369

LABORATORY

Bacteriologist and pathologist with wide administrative experience; Ph.D., Brown University; will consider leading position in his field. L371

Experienced laboratory director with background of dairy products manufacture and research in control methods; University of Wisconsin, M.S. and Ph.D., desires administrative position with food manufacturing or processing industry, or association with health department doing routine and research work in food control. L381

MISCELLANEOUS

Experienced teacher in bacteriology and public health, Ph.D., Cornell; now professor in Grade A medical school, will consider teaching, executive or administrative position. M327

Dentist, graduate of Temple University, with excellent postgraduate experience, desires position in administrative aspects of dental hygiene. M352

Public health engineer, B.S. in Sanitary Engineering from Massachusetts Institute of Technology, experienced in Massachusetts, Connecticut and Kentucky, seeks position as sanitary or public health engineer with health department. E380

NEWS FROM THE FIELD

WASHINGTON NEWS LETTER ON SOCIAL LEGISLATION

PROPOSED federal legislation of interest to public health officers is covered in the *Washington News Letter on Social Legislation* which began publication in January. It will report current developments regarding proposals

- To expand public health services
- To provide increased health protection for mothers and babies
- To construct and improve hospitals
- To provide medical care for needy persons
- To provide disability insurance
- To establish a federal or state system of health insurance

The *News Letter* seeks to present the best opinions obtainable as to the prospects and significance of these proposals. It concerns itself more with "off the record thinking" and "behind the scenes" situations than official statements. It also covers amendments suggested by state officials and their evaluations of amendments from other sources.

The *News Letter* will be issued bi-weekly while Congress is in session with special editions on matters of immediate interest at a cost of \$5 per subscription. For information, write Glen Leet, Editor, *Washington News Letter on Social Legislation*, 1733 Nineteenth Street, N. W., Washington, D. C.

NEW YORK PUBLIC HEALTH EDUCATION

A NEW 3 year plan for the extension of public health education work in the Health Department has been announced by Health Commissioner John L. Rice, of New York City.

Mr. Philip S. Broughton, who was connected with the recent nation-wide syphilis education campaign of the U. S. Public Health Service, has been appointed head of this project.

PUBLIC SCHOOL REPORT

EARLY in January there was submitted to the New York State Board of Regents a report on a 2 year inquiry on the public school system in New York State. A sub-committee on the School Health Program, under the Chairmanship of Professor C.-E. A. Winslow of Yale, reported that routine annual physical examinations had become so perfunctory that only glaring physical defects and common contagious diseases were usually detected. It was recommended that these examinations be abolished in favor of a new law to make thorough medical examinations compulsory for all children at only three intervals in their school careers.

In reporting that there were in existence many ill-lighted, ill-ventilated and otherwise unsanitary school buildings, the committee recommends the employment of a public health engineer under the Educational Department to counsel local school authorities on structural problems.

One portion of the report devoted to conditions in school buildings constitutes a vigorous attack on the system of ventilation now prescribed for all schools by state law, requiring all buildings to be fitted with mechanical ventilation systems capable of producing 30 cubic feet of fresh air a minute for each pupil. The committee holds that such systems are extravagantly costly, unnecessary, and even unhealthful. It was noted that the simple process of raising and lowering windows fitted with slanting boards to prevent drafts was far superior to the present plan.

In recommending that the first attempt to build a sane and thorough program of mental hygiene should originate in the state's schools, which are "the primary agency through which

modern concepts of human behavior can reach community thinking and practice," the committee reported that "teachers who would be considered by mental hygienists to have harmful effects upon children are found in abundance in the state schools."

In the section devoted to health services and examinations, the committee proposed that both physical tests and remedial work be left whenever possible to the family physicians of pupils. It held that medical inspectors now employed by schools were as a group not well qualified for their work and that the elimination of private doctors as now generally practised sapped the parents of responsibility for their children's welfare.

The practice of basing state aid to schools on attendance rather than on enrollment was reported by the committee to have caused numerous instances in which the health interests of children were sacrificed to the building up of financially profitable attendance records.

OHIO HEALTH COMMISSIONERS CONFERENCE

THE annual conference of Ohio health commissioners was recently called by Walter H. Hartung, M.D., State Director of Health. Among those who addressed the conference were: Allen W. Freeman, M.D., Professor of Public Health and Hygiene at Johns Hopkins University, Baltimore, and John A. Toomey, M.D., Associate Professor of Pediatrics, Western Reserve University School of Medicine, Cleveland.

Dr. Barney J. Hein, President of the Ohio State Medical Association, assured the conference that the medical profession supports whole-heartedly a public health program, and stressed the desirability of close and harmonious cooperation between official health workers and physicians.

U. S. HOUSING AUTHORITY ANNIVERSARY

NOVEMBER 1, 1938, marked the first anniversary of the U. S. Housing Authority.

Two hundred cities, with a total population of 33 million people, have housing authorities at the present time, and federal funds amounting to 575 million dollars have been earmarked for 142 cities.

NEW YORK CITY CONTROLS ADDITION OF CHEMICALS TO WATER SUPPLY

IN what may be the first instance in which a department of health has promulgated specific regulations concerning the addition of chemicals to a water supply for anticorrosion or anti-scaling purposes, the Board of Health of the City of New York on December 12 adopted regulations requiring a permit to be issued to persons who make a business of this work. The chemicals which may be added are limited and specified, and the amount which may be added is limited in terms of total hardness or total silica content of the water. The regulations also govern the mechanical device or apparatus constructed to regulate the chemical dosage, which must be approved by the Commissioner. There must also be provided protective means to prevent backflow or siphonage of treated water into the public water supply system. The regulations are effective April 1, 1939.

STATE LABORATORY DIRECTORS' TRANSACTIONS

THE Conference of State Laboratory Directors announces that mimeographed copies of the transactions of the Conference held at Kansas City on October 24, 1938, will shortly be available at 50 cents a copy. They may be secured from C. A. Perry, Sc.D., Secretary-Treasurer, 2411 N. Charles Street, Baltimore, Md.

NEW JERSEY HEALTH COMMITTEE

A SPECIAL committee, to be known as The New Jersey Committee on Health and Welfare, has been appointed by Governor A. Harry Moore.

This committee, the purpose of which is "to follow up and determine applications to the needs of New Jersey of certain of the considerations brought out at the Washington Conference in July," is under the chairmanship of Robert C. Clothier, LL.D., President of Rutgers University, New Brunswick, N. J.

AMERICAN CONGRESS ON OBSTETRICS

THE first American Congress devoted to a consideration of medical, nursing, and other problems associated with human reproduction will be held in the Municipal Auditorium, Cleveland, Ohio, from September 11 to 15, 1939. It will be designated as The American Congress on Obstetrics and Gynecology.

The promotion and sponsorship of the congress has been delegated to the American Committee on Maternal Welfare, Inc., which includes the following organizations in its membership:

- American Association of Obstetricians, Gynecologists and Abdominal Surgeons
- American College of Surgeons
- American Gynecological Society
- American Hospital Association
- American Nurses Association
- American Protestant Hospital Association
- American Medical Association Section on Obstetrics and Gynecology
- American Public Health Association
- Central Association of Obstetricians and Gynecologists
- Chicago Maternity Center
- Maternity Center Association of New York
- National Medical Association
- National League of Nursing
- National Organization for Public Health Nursing
- New England Obstetrical and Gynecological Society
- Pacific Coast Society of Obstetrics and Gynecology
- Southern Medical Association
- U. S. Bureau of the Census
- U. S. Children's Bureau
- U. S. Public Health Service

The purpose of this congress is to afford opportunities for discussing and publicizing the problems associated with human reproduction and the health of women and new-born babies.

The last International Congress of Obstetrics and Gynecology was held in Amsterdam, Holland, in May, 1938. Its success stimulated a desire to hold a subsequent one in five years in another European country.

MONTREAL ANTI-TUBERCULOSIS DRIVE

A TUBERCULOSIS Section in the Department of Health of Montreal, Que., has been authorized on the recommendation of Dr. Abelard Groulx, Director of the Department. The object of this new Section is to control, coördinate, and intensify the drive against tuberculosis in Montreal.

A meeting was organized by the Provincial Committee for the Prevention of Tuberculosis, in coöperation with the Department of Health, to launch the campaign. Among the speakers were Jean Gregoire, M.D., D.P.H., Deputy Minister of Health, who stated that there were at least 5,000 persons afflicted with tuberculosis at large in the Province, and stressed the necessity of an educational campaign; and A. Grant Fleming, M.D., D.P.H., Dean of the Faculty of Medicine, McGill University, who promised the support of McGill University in the present drive.

N.O.P.H.N. COMMITTEE OF FIVE

THE Executive Committee of the National Organization for Public Health Nursing, at its November meeting, appointed a Committee of Five to coöperate with the President's Interdepartmental Committee to Coördinate Health and Welfare Activities.

This committee consists of Grace Ross, Chairman, Mrs. Charles Brown, Elizabeth G. Fox, Livingston Farrand, M.D., and Dorothy Deming.

THE PRESIDENT'S MESSAGE ON HEALTH SECURITY

ON January 23, President Roosevelt transmitted to Congress a special message on health security specifically developing the subject mentioned in his annual message and commenting on the recommendations on national health prepared by the Interdepartmental Committee to Coördinate Health and Welfare Activities.

The report by Miss Josephine Roche as Chairman of the Interdepartmental Committee, attached to the President's message, points out that, though there can be no doubt that the general level of health in the United States is higher today than at any other time in the nation's history, nevertheless the evidence is equally clear that not all of the American people have shared adequately in this progress. In both rich states and in poor states there are large groups of persons for whom life is still as uncertain and as brief as if the scientific progress of the past half century had not occurred.

Specifically, the Interdepartmental Committee is now recommending to the President and to Congress four items as follows:

A. The expansion and strengthening of existing federal-state coöperative health programs under the Social Security Act through more nearly adequate grants-in-aid to the states and, through the states, to the localities.

B. Grants-in-aid to the states for the construction, enlargement, and modernization of hospitals and related facilities where these are nonexistent or inadequate but are needed, including the construction of health and diagnostic centers in areas, especially rural or sparsely populated, inaccessible to hospitals, including grants toward operating cost during the first years of such newly developed institu-

tions to assist the states and localities in taking over responsibilities.

C. That the federal government provide grants-in-aid to the states to assist in developing programs of medical care. It is conceded that a state program of medical care should take account of the needs of all persons for whom medical services are now inadequate besides focusing on the need of those persons for whom governmental agencies have already accepted some degree of responsibility. Committee studies show that attention should also be focused on the needs of the entire population, or at least on the needs of all low income groups. The committee is of the opinion that medical services are now inadequate among self-supporting people with small incomes, as well as among needy and medically needy persons. The committee believes that choice of the groups to be served, the scope of the services furnished, and the methods used to finance the program should be made by the states, subject to conformity of the state plans with standards necessary to insure effective use of the federal grants-in-aid.

To finance the program two sources of funds could be drawn upon by the states: (a) general taxation or special tax assessments, and (b) specific insurance contributions from the potential beneficiaries of an insurance system. The committee recommends grants-in-aid to states which develop programs using either method or a combination of the two, to implement programs of medical care. The committee believes it to be of fundamental importance that a medical care program developed by a state should be a unified program applicable to all groups to be served.

D. The development of social insurance to insure partial replacement of wages during temporary or permanent disability.

A complete report of the recommendations made by the President and the Interdepartmental Committee may be found in *Document 120*, 76th Congress, First Session, House of Representatives, which is obtainable from the Superintendent of Documents, Washington, D. C.

HARVARD SYMPOSIUM ON VIRUS AND RICKETTSIAL DISEASES

THE Faculty of the Harvard School of Public Health offers a short course of lectures, clinics, and demonstrations on the virus and rickettsial diseases, with special emphasis on their public health significance, at the School during the week of June 12-17, 1939.

Lectures on the etiology, epidemiology, and methods of control of these diseases, given by members of the Faculties and by former students of the Harvard School of Public Health and of the Harvard Medical School, will occupy five mornings. Special clinics and demonstrations will be given each afternoon. In some instances these demonstrations will be continued through the week, so that all the members of the symposium can attend. On the last morning, a panel discussion will be held on the three main topics presented in the symposium.

The fee for the course will be \$25.00, payable at any time up to June 12. Enrollment, however, should be arranged before June 1. Further information may be had by writing to the Secretary, School of Public Health, 55 Shattuck Street, Boston, Mass.

VITAMIN RESEARCH PRIZE OFFERED

TO promote interest in research on the water-soluble "B-complex" vitamins, Mead Johnson and Company, Evansville, Ind., has established an annual award of \$1,000 to be presented over a period of five years, through the American Institute of Nutrition. A committee of members of the Institute will select the recipient, and the presentation will be made a feature of its annual spring meeting.

The award will be given to the laboratory (non-clinical) or clinical research worker in the United States or Canada who in the opinion of the judges has published during the previous calendar year the most meritorious report deal-

ing with the B-complex vitamins. If circumstances and justice dictate, the prize may be divided among two or more persons, or it may be given to a worker for valuable contributions over an extended period, but not necessarily representative of a given year.

Nominations may be sent at any time to: Leonard A. Maynard, Ph.D., Laboratory of Animal Nutrition, Cornell University, Ithaca, N. Y. To be considered for the award at any given spring meeting, the nomination must be received by January 15.

PERSONALS

Central States

DR. MARY ALLEN, of Cleveland, Ohio, was recently appointed Staff Physician of the Bureau of Maternal and Child Health of the Wisconsin State Department of Health. She succeeds DR. RUTH A. B. BENNETT, of Galveston, Tex., who resigned.

LLOYD L. ARNOLD, A.M., M.D.,* Professor of Bacteriology and Public Health at the University of Illinois College of Medicine, and Director of the Chicago laboratories of the State Department of Health, has been appointed a member of the Chicago Board of Health, succeeding LOUIS E. SCHMIDT, M.D.,* resigned.

DR. FRANCIS A. DULAK, a member of the staff since 1934, has been appointed Secretary of the Chicago, Ill., Board of Health, following the resignation of LOUIS E. SCHMIDT, M.D.*

G. HOWARD GOWEN, M.D., Ph.D.,* has resigned as Director of the Champaign-Urbana Public Health District, Champaign, Ill., to accept the position of Chief Medical Officer of the Chicago Board of Health, effective in December, 1938.

HAROLD A. WHITTAKER,* of Minneapolis, Director of the Division of

* Fellow A.P.H.A.

† Member A.P.H.A.

Sanitation, Minnesota State Department of Health, and a member of the Committee on the Hygiene of Housing of the A.P.H.A., returned in January from Geneva, Switzerland, where he attended a meeting of the Committee on Housing of the League of Nations which met in December.

Eastern States

DR. HERBERT M. GODDARD, of Philadelphia, Pa., has been appointed Assistant Director of Public Health, to succeed the late DR. ALFRED F. ALLMAN.

ROBERT M. HURSH, M.D., has been appointed Health Officer of Harrisburg, Pa., succeeding the late JOHN M. J. RAUNICK, M.D.,* who had served since 1912.

H. G. STEVENS, M.D., has been appointed Health Officer of Sherman, Conn., succeeding R. W. MUNCH.

Southern States

NORMAN G. ANGSTADT, M.D.,† of New Martinsville, W. Va., has been appointed Health Officer of Wetzel County, to succeed DR. JOHN B. HOZIER, Acting Health Officer during the past year.

DR. WILLIAM A. BEVACQUA, of Charleston, W. Va., has been appointed Health Officer of Parkersburg and Wood County, to succeed ARTHUR D. KNOTT, M.D.,* of Parkersburg, resigned.

DR. TERRY BIRD, of Tavares, Fla., has been appointed in charge of the newly created Lake County Health Unit.

FREDERICK E. DARGATZ, M.D.,† formerly of Kinsley, Kans., has been appointed Director of the health unit of Ardmore, Okla., to succeed DR. RICHARD M. PARISH.

DR. MARTIN L. FULLER has been appointed City Health Officer of

Amarillo, Tex., recently separated from the Potter County Health Unit. EARLE C. GATES, M.D., has been appointed Health Officer of the Washington-Bristol Health Department, with headquarters in Bristol, Va., He succeeds MACK I. SHANHOLTZ, M.D.,† who resigned to accept a position in Oklahoma.

DR. HENRY J. GERMANY, of Waco, was recently appointed City Health Officer of Waco, Tex., succeeding the late DR. GEORGE M. LIDDELL, who had resigned October 1.

ELINOR D. GREGG,* Director of Nursing of the U. S. Indian Service, Washington, D. C., has resigned, effective January 1.

J. H. LEVAN, C.E.,† is in charge of the *Aedes aegypti* Control Unit, U. S. Public Health Service—with headquarters at the Miami Beach Quarantine Station—which is engaged in a *Stegomyia* survey and control at Key West, Fla., in coöperation with local authorities.

THOMAS PARRAN, M.D.,* Surgeon General of the U. S. Public Health Service, Washington, was awarded the William Freeman Snow Medal for outstanding service to social hygiene, at the 26th Annual Meeting of the American Social Hygiene Association in Washington, D. C., on February 1. According to the announcement, "Dr. Parran has been chosen for the award because of his great contribution to the health and happiness of the American people through his persistent efforts against syphilis and the conditions which favor its spread."

PAUL S. PARRINO, M.D.,† has been appointed Health Officer of Franklin, La., to succeed FORD S. WILLIAMS, M.D.

DR. GEORGE T. ROYSE has been appointed County Health Officer of

* Fellow A.P.H.A.

† Member A.P.H.A.

Potter County, Tex., with headquarters at Amarillo.

COL. JOSEPH F. SILER,† Director of the Army Medical School, Washington, D. C., has been awarded the Dr. George M. Kober Lectureship in recognition of his work in medical research.

FORD S. WILLIAMS, M.D.,‡ formerly Medical Director of St. Mary Parish Health Department, Franklin, La., has been appointed Louisiana State Director of Venereal Disease Control by the State Board of Health.

DR. REED WOLFE, of Sulphur, Okla., has been appointed Health Superintendent of Choctaw County.

Western States

J. WARREN BELL, M.D., PH.D.,* formerly Director of the Division of Maternal and Child Health of the Nebraska State Department of Health, has been appointed Medical Director of the National Society for the Prevention of Blindness, New York, N. Y.

DR. WILLIAM A. CLARKE has been appointed Health Officer of Holtville, Calif., to succeed DR. HARRY B. GRAESER.

CHARLES C. GANS, M.D.,‡ of Redwood City, Calif., Health Officer of the County of San Mateo, is now also Health Officer of San Mateo City, which has recently come under the county's jurisdiction. DR. JAMES A. WARBURTON has served for many years as Health Officer of the City of San Mateo.

Canada

ELIZABETH L. SMELLIE, R.N.,* Chief Superintendent of the Victorian Order of Nurses for Canada, Ottawa, Ont., was awarded the Mary Agnes Snively Memorial Medal by the Canadian Nurses Association in recognition of Miss Smellie's contribution to Canadian nurses and nursing.

Cuba

DR. DOMINGO F. RAMOS,* Secretary of Defense and Director of Public Health of Cuba, has been elected an honorary member of the American Club. This distinction has rarely been accorded either American or Cuban citizens since the Club was founded 37 years ago. The *Havana Post* reports that the Club's Board of Governor's, which elected Dr. Ramos unanimously, took into account the fact that he is regarded throughout Latin-America as the exemplification of the highest standard of ethics in his profession.

Deaths

V. H. BASSETT, M.D.,* City-County Health Officer of Savannah, Ga., died November 3, 1938.

W. J. V. DEACON, M.D.,* of East Lansing, Mich., died December 20, at the age of 70. He had been a member of the staff of the Michigan Department of Health since 1919, coming to Lansing from the Kansas State Health Department, where he was State Registrar. He had been a member of the A.P.H.A. since 1912 and was a Charter Fellow. He was Vice-Chairman of the Vital Statistics Section in 1917-1918, and Chairman in 1924.

HANS CHRISTIAN JOACHIM GRAM, whose name is known all over the world as the discoverer of the system of bacteriological staining which bears his name, died November 14, 1938. He was born in 1853, in Denmark. His professional career covered several fields. He was a laboratory worker, a pharmacologist, and head of a hospital service.

LOUIS ISRAEL HARRIS, M.D., Health Commissioner of New York, 1926-1928, died January 6, at the age of 56. He became a member of the

* Fellow A.P.H.A.

† Member A.P.H.A.

A.P.H.A. in 1915, and a Charter Fellow in 1922. He was Vice-President in 1930, a member of the Governing Council 1922-1925, and served on the Executive Board in 1929.

WILLIAM C. HUNSICKER, M.D.,† Director of the Department of Public Health of Philadelphia, Pa. and a former State Senator, died January 10, at the age of 65. Dr. Hunsicker was Professor of Urology at the Hahnemann Medical College for many years.

† Member A.P.H.A.

JOSEPH C. SAILE, M.D.,† for 32 years Health Officer of Bloomfield, N. J., and former President of the New Jersey State Health Officers Association, died January 12, at the age of 76.

WILLIAM R. TRACEY,* Chief of Vital Statistics, Dominion Bureau of Statistics, Ottawa, Canada, died January 9. He had been a member of the A.P.H.A. from 1935, and a Fellow from 1937; and was recently Vice-Chairman of the Vital Statistics Section.

CONFERENCES AND DATES

American Association for Social Security. New York, N. Y. April 7-8.

American College of Physicians—23rd Annual Session. Municipal Auditorium, New Orleans, La. March 27-31.

American Congress on Medical Education and Licensure. Palmer House, Chicago, Ill. February 13-14.

American Congress on Obstetrics and Gynecology—sponsored by the American Committee on Maternal Welfare, Inc. Municipal Auditorium, Cleveland, Ohio. September 11-15.

American Library Association. San Francisco, Calif. June 18-24.

American Orthopsychiatric Association—16th Annual Meeting, on Behavior and Its Disorders. Commodore Hotel, New York, N. Y. February 23-25.

American Medical Association, 90th Annual Meeting. St. Louis, Mo. May 15-19.

American Public Welfare Association. Buffalo, N. Y. June 20-22.

American Society of Civil Engineers—Spring Meeting: Chattanooga, Tenn., April 19-22. Summer Meeting:

San Francisco, Calif., July 26-29.
Fall Meeting: New York, N. Y., September 4-9.

American Water Works Association—59th Annual Meeting. Ambassador Hotel, Chelsea Hotel, Atlantic City, N. J. June 11-15.

New Jersey Section. New Brunswick, N. J. February 7.

New York Section. Sagamore Hotel, Rochester, N. Y. March 30-31.

Kentucky-Tennessee Section. Peabody Hotel, Memphis, Tenn. April 10-12.

Canadian Section. Royal York Hotel, Toronto, Ont. April 12-14.

Montana Section. Great Falls, Mont. April 14-15.

Illinois Section. Urbana-Lincoln Hotel, Urbana, Ill. April 20-22.

Indianapolis Section. Antlers Hotel, Indianapolis, Ind. April 25-26.

Ohio Section. Van Cleve Hotel, Dayton, Ohio. April 27-28.

Pacific-Northwest Section. Tacoma, Wash. May 18-20.

Building Officials Conference of America. Detroit, Mich. May 1-5.
Civil Service Assembly—Eastern Re-

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LIBRARY Number 3
BALTIMORE COLLEGE OF
DENTAL SURGERY

Diphtheria Immunization With Fluid Toxoid and Alum Precipitated Toxoid*

Preliminary Report

VLADIMIR K. VOLK, M.D., D.P.H., F.A.P.H.A., AND
WILLIAM EDWARD BUNNEY, PH.D., F.A.P.H.A. †

THE studies were planned to investigate the height and duration of the antitoxic immunity following immunization with fluid and alum precipitated diphtheria toxoid. Conflicting reports^{1, 2, 3, 4} on the comparative values of these two antigens made such a study seem important. We present a comparison of results from 1 dose of alum precipitated toxoid and 2 doses of fluid toxoid at 4 months, 1 year, and 2 years after injection; and a comparison of 2 doses of alum precipitated toxoid and 3 doses of fluid toxoid at 4 months after injection.

METHODS

The study is being carried out on free-living children primarily from rural

schools in Saginaw County, a county of about 1,110 square miles. A total of 1,800 children are included in the report. The following procedures were used in immunization:

1. 1 injection of fluid toxoid
2. 2 injections of fluid toxoid (2 weeks apart)
3. 2 injections of fluid toxoid (3 weeks apart)
4. 3 injections of fluid toxoid (3 weeks apart)
5. 1 injection of alum precipitated toxoid
6. 2 injections of alum precipitated toxoid (3 weeks apart)

In addition a group of unselected children who received no injection were blood titrated at the end of 4 and 12 months. In a strictly controlled group alternate children in each school received the 2 immunizing agents. In this way 2 doses of fluid and 1 of alum precipitated toxoid were compared in some schools, and 3 doses of fluid compared with 2 doses of alum precipitated toxoid in other schools. The results from these controlled groups are analyzed separately as well as combined

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† With the technical assistance of Anita Leavitt, Ann Sonderman and Louise Hagaman.

with the results obtained when alternate schools received the 2 immunizing agents. The schools included in the investigation number 110.

It was decided to follow the immunity response by blood titrations only. The Schick test was not used because of the well known fact that the Schick test itself has an antigenic effect, especially when given to a child already having antitoxin circulating in its blood. Therefore, before giving immunizing treatment, 4-5 ml. of blood were taken from the children. The children were bled again in 4 months and 12 months, and will be bled every 12 months thereafter for the duration of the study so that not only the height of the antitoxin level but the relative permanence of that level will be determined. A 1 ml. injection of the fluid or alum precipitated toxoid was given subcutaneously in the upper arm. Whenever a second or a third injection was given, a 3 weeks' interval usually elapsed between the injections. A small group was given injections with a 2 weeks' interval.

The toxoid used was obtained from

a commercial firm by Dr. W. T. Harrison of the National Institute of Health. It was felt advisable to use such a product because it was widely available. The alum precipitated toxoid was prepared from the fluid toxoid used in the study. This was felt to be important because of the possibility that two different preparations of toxoid might vary in some intrinsic antigenic efficacy for which we have no method of determination. The preparation used had a high average potency. The National Institute of Health tests showed 20 L_t /ml., and the alum precipitated toxoid to stimulate production of an average of 2-4 units of antitoxin in guinea pigs in the National Institute of Health control tests for alum precipitated toxoid. On the re-resolution of the alum precipitated toxoid it was likewise found to have 20 L_t /ml.

RESULTS

Of the 1,800 children, 358, or 20 per cent, had titratable antitoxin (.001 unit or more per ml.) in their circulating blood at the time of the first injection

TABLE I
Age Distribution of Children in the Study

Age	1 A. P.	2 A. P.	1 Fluid	2 Fluid	3 Fluid	Titration (No Toxoid)	Total
8 Mos.	1	1	1	..	..	..	3
1 Yr.	2	5	..	1	..	..	8
1½ Yr.	2	2	..	2	..	..	6
2	1	2	2	2	1	1	9
3	8	3	2	5	3	2	23
4	37	13	2	10	9	1	72
5	97	60	15	38	41	2	253
Total	148	86	22	58	54	6	374—20.8%
6	156	98	15	94	82	..	445
7	146	59	7	60	49	3	324
8	101	35	8	18	40	4	206
9	73	32	4	22	29	..	160
10	41	25	5	22	22	2	117
Total	517	249	39	216	222	9	1,252—70. %
11	14	6	..	16	19	..	55
12	15	9	1	16	13	..	54
13	8	8	1	11	13	1	42
14	4	2	1	5	7	..	19
15	..	..	1	1	2	..	4
Total	41	25	4	49	54	1	174—9.2%
Grand Total	706	360	65	323	330	16	1,800

of antigen. The majority showed a marked rise in antitoxin content following the injections and of course are not included in the results analyzed in this report. This leaves 1,442 children with less than .001 unit of antitoxin at the time of the first injection, and this paper is concerned with a comparison of the antitoxin levels in these children following the different methods of immunization described.

Table I shows the age distribution of the 1,800 children. Of these, 374 or about 28 per cent, are of preschool age; 1,252, or 70 per cent, are between the ages of 6 and 10; and 174, or 9.2 per cent are between the ages of 11 and 15. Included are 201 cases from Genesee County, studied in coöperation with Dr. L. V. Burkett, Genesee County Health Commissioner, Flint, Mich.

As stated, part of the children were in a strictly controlled group with each alternate child receiving different immunizing procedures. These results are entered in Table II under "controlled." For the rest of the children the two immunizing agents were given in alternate schools. This group is classified as "uncontrolled" in Table II. It is evident that the results in the two groups are strictly comparable. The number of children developing .001 unit or more of antitoxin is made the basis of analysis in this table. The

two groups proved equally comparable when .01 or 0.1 unit was the basis of comparison. To conserve space, analyses at these levels are not included here. Since the "controlled" and "uncontrolled" groups are comparable, the results from the two groups are pooled in the remainder of the report to simplify presentation.

Table III shows the comparison of the antitoxin response of the children to different immunizing procedures. Of the children who received no immunizing injection 11 per cent developed antitoxin at the end of 4 or 12 months. This is rather high for a community with the low carrier rate (see later) we have found in Saginaw County. However, all of these children merely changed from less than .001 to .001 unit and may very well represent only the degree of unreliability of the titrations at this low level. The group that received one injection of fluid toxoid responded very poorly by the end of 10 days and the antitoxic response was still low at the end of 4 and 12 months.

The group that received one injection of alum precipitated toxoid also responded very poorly at the end of 10 days, having 27 per cent with .001 or more units of antitoxin.

One hundred and sixty children who received 2 injections of fluid toxoid at 3 week intervals showed an antitoxic

TABLE II

Comparison of Antitoxin Response to the Different Immunizing Procedure in Controlled and Uncontrolled Groups

(Antitoxin level at time of 1st injection < .001)

Immunizing Preparation and Procedure	Group	4 Months			12 Months		
		No. in Group	Children With .001 or More		No. in Group	Children With .001 or More	
			No.	%		No.	%
2 injections fluid	Controlled	129	82	63.5	88	53	62.5
3 wk. interval	Uncontrolled	31	20	64.5	23	12	52.1
1 injection A. P.	Controlled	116	105	90.5	101	86	85.1
	Uncontrolled	236	222	94.0	226	199	88.0
3 injections fluid	Controlled	113	113	100.0	..	..	...
3 wk. apart	Uncontrolled	49	46	93.8	49	47	95.9
2 injections A. P.	Controlled	138	138	100.0	..	..	...
3 wk. apart	Uncontrolled	10	10	100.0	..	..	...

TABLE III

Comparison of Antitoxin Response to the Different Immunizing Procedures
(All cases $<.001$ antitoxin level at primary titration)

Immunizing Procedure	10 Days			4 Months			12 Months			18 Months			24 Months		
	Children With .001 or More			Children With .001 or More			Children With .001 or More			Children With .001 or More			Children With .001 or More		
	No. in Group			No. in Group			No. in Group			No. in Group			No. in Group		
	No.	%		No.	%		No.	%		No.	%		No.	%	
No injection	..	..	....	61	6	11.5	19	2	10.5	..	..	....	..	..	....
1 injection Fluid	86	18	20.9	12	2	16.6	10	2	20.0	..	..	....	..	..	....
2 injections Fluid															
2 wk. apart	..	..	....	14	12	85.6	15	9	60.0	..	..	....	13	6	46.1
2 injections Fluid															
3 wk. apart	..	..	....	160	103	64.4	111	67	60.4	9	4	44.4	..	..	....
1 injection A. P.	80	22	27.5	352	327	93.0	327	285	87.3	19	15	79.0	152	118	77.6
3 injections Fluid															
3 wk. apart	..	..	....	162	159	98.1	49	47	96.0	..	..	....	..	..	....
2 injections A. P.															
3 wk. apart	..	..	....	148	148	100.0	..	..	....	..	..	....	..	..	....

response in 64 per cent at the end of 4 months. This percentage was reduced to 60 per cent at the end of 12 months, and 45 per cent at the end of 18 months.

For comparison the antitoxic response may be noted when the interval was reduced to 2 weeks. The figures indicate that 85 per cent showed a response at the end of 4 months, 60 per cent at the end of 12 months, and even 46 per cent at the end of 24 months. The difference between these and the 3 week interval results is not statistically significant with the numbers concerned.

Better response was observed in the group of 352 children who received one injection of alum precipitated toxoid.

In this group 93 per cent showed an increase in antibody at the end of 4 months. As time went on some loss of antitoxin was noticed, although 75.7 per cent still maintained the increased antitoxin level at the end of 2 years. The difference between these and the 2 fluid toxoid injection results is statistically significant and can be considered as proved under the conditions of this study.

Of 162 children who received 3 injections of fluid toxoid at 3 week intervals, 98 per cent showed an increase in circulating antitoxin at the end of 4 months, and 96 per cent at the end of 12 months.

Of 148 children who received 2 in-

TABLE IV

Comparison of Antitoxin Levels 10 Days After a Single Injection of Fluid or A. P. Toxoid in Children Having $<.001$ at Time of Injection

		Units of Antitoxin per 1 ml. of Serum												
		<.001		.001<.004		.004<.01		.01<.04		.04<.1		.1 plus		Total Number
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
10 days after one injection of fluid		68	79.0	6	7.0	..	....	1	1.0	3	4	8	9.0	86
10 days after one injection of A. P.		58	72.5	6	7.5	..	....	1	1.3	..	....	15	18.7	80

TABLE V

Comparison of Antitoxin Levels 10 Days After One Injection of Fluid or A. P. Toxoid in Children Having <.001 Unit or More

Kind of Toxoid	No. of Cases	Units of Antitoxin per ml. of Serum		Number at Time of 1st Injection	Number 10 Days Later
Fluid	41	<.001			3
		.001	<.004	9	0
		.004	<.01	3	0
		.01	<.04	7	0
		.04	<.1	6	0
		.1 plus		16	38
Alum precipitated	30	<.001			1
		.001	<.004	6	0
		.004	<.01	3	0
		.01	<.04	8	0
		.04	<.1	6	0
		.1 plus		7	29

tions of alum precipitated toxoid and who were followed for a period of 4 months only, 100 per cent showed an antitoxin response within 4 months. Twelve months have not elapsed since the last injection.

Table IV shows the antitoxin response at the end of 10 days after a single injection of either fluid or alum precipitated toxoid. Those receiving fluid toxoid who did not have titratable antitoxin to start with showed an increase in 21 per cent only, although it can be seen from the table that some show a surprisingly high rise in antitoxin level.

Groups which received alum precipitated toxoid injections showed an increase in antitoxin in 28 per cent of the children at the end of 10 days.

A group of children who had more than .001 unit of antitoxin demonstrated prompt response to antigenic stimulation. This can be seen in Table V. These results are interesting because of the frequent questions as to the advisability of giving immunizing injections after exposure. In cases of exposure to diphtheria it might be a very desirable procedure to give some kind of antigen to children. Of the 4 chil-

TABLE VI

Distribution of Antitoxin Levels After Various Immunizing Procedures and Following Different Intervals

(All children having <.001 unit before injection)

Antitoxin Response from Two Doses of Fluid Toxoid, 3 Weeks Apart
Units of Antitoxin per ml. of Serum

No. of Cases	Time of Titration	<.001		.001<.004		.004<.01		.01<.04		.04<.1		.1 plus	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
160	4 months	57	35.6	26	16.2	24	15.0	23	14.4	12	7.5	18	11.3
111	12 months	44	39.7	25	22.5	11	9.9	20	18.0	2	1.8	9	8.1
9	18 months	5	55.6	1	11.1	0	0.0	2	22.2	0	0.0	1	11.1

Antitoxin Response to One Dose Alum Precipitated Toxoid

352	4 months	25	7.1	68	19.3	58	16.5	96	27.2	46	13.1	59	16.8
327	12 months	42	12.8	69	21.1	61	18.7	107	32.7	18	5.5	30	9.2
19	18 months	4	21.0	4	21.0	4	21.0	6	31.8	1	5.2	0	0.0
152	24 months	34	22.4	33	21.7	28	18.4	35	24.0	9	5.9	13	8.6

Antitoxin Response to Three Doses of Fluid Toxoid 3 Weeks Interval

162	4 months	3	1.9	13	8.0	24	14.8	52	32.1	29	17.9	41	25.3
49	12 months	2	4.1	4	8.2	5	10.2	16	32.6	12	24.5	10	20.4

Antitoxin Response to Two Doses of A. P. Toxoid 3 Weeks Interval

148	4 months	0	0.0	2	1.4	4	2.7	21	14.2	41	27.7	80	54.0
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dren who failed to show an increase in antitoxin, 3 had a titer of less than .002 unit and 1 a titer of .004 unit per ml. before injection. Whether these represent a negative phase or the unreliability of titrations at this low level of antitoxin cannot be said. This phase of the problem is receiving further detailed study.

Table VI shows the actual antitoxin levels achieved at different intervals following the several immunizing procedures. It is evident that a procedure which causes more children to develop an appreciable antitoxin titer also produces more with antitoxin in higher concentrations.

In our series of 360 children receiving 2 injections of alum precipitated toxoid, we observed no reactions indicative of sensitivity following the second injection. It is indeed suggestive that 2 injections of alum precipitated toxoid produce the highest antitoxin level of all procedures tried. As we started this group in the spring, we are not in

a position to present observations for longer than 4 months.

Table VII shows a comparison of response in preschool and school children receiving one injection of alum precipitated toxoid and fluid toxoid. There may be a tendency for the preschool children to show a better response to the immunizing treatment than the school children but the figures are not large enough for the differences to be significant. Further work is being done on this point.

In addition to following the immunity response, a continual diphtheria carrier survey is being carried on in the schools. Throat cultures are taken from all the school children irrespective of whether they have received toxoid or not. This is felt to be essential for the intelligent evaluation of the immunizing results obtained because one might expect a much higher antitoxin response in a locality with a high carrier rate of virulent diphtheria organisms and a lower response in a locality where

TABLE VII
Comparison of Antitoxin Response in Preschool and School Age Groups Having <.001 at Time of Injection

Immunizing Procedure	Age Group	4 Months			12 Months			24 Months		
		No. in Group	Children With .001 or More		No. in Group	Children With .001 or More		No. in Group	Children With .001 or More	
			No.	%		No.	%		No.	%
1 injection	5 yrs. and under	63	61	96.8	59	53	89.9	33	28	84.8
A. P. toxoid	6 yrs. and over	316	292	92.4	268	232	86.6	..	..	...
2 injections	5 yrs. and under	29	19	65.5	12	9	75.0	..	..	....
Fluid toxoid	6 yrs. and over	131	84	64.2	99	58	58.6	..	..	....

TABLE VIII
Saginaw County Diphtheria Carrier Survey

Year	No. of Cultures Taken	Per cent Pos. KL	No. of Positive KL					
			Pathog.		Non Pathog.		No Virulence Test Made	
			No.	%	No.	%	No.	%
1936	3,522	.4	8	.23	3	.09	3	.09
1937	6,636	.5	14	.21	14	.21	6	.09
1938	9,188	.37	9	.1	21	.23	5	.05
Total	19,346	.42	31	.16	38	.2	14	.07

exposure to virulent diphtheria organisms is a rarity.⁵ An attempt is being made to take throat cultures at regular intervals during the months of highest morbidity rate. Every positive culture is now being examined for virulence and the child is tested repeatedly as long as it remains a carrier. Of the 19,346 throat cultures taken 83 were found KL positive, of whom 31 were found virulent (see Table VIII). The antitoxin level of all diphtheria carriers is determined at frequent intervals in order to evaluate influences of harbored diphtheria bacilli on the immunity response of the child.

The diphtheria carrier survey covered 119 schools, and 7,347 children were cultured.

DISCUSSION

This paper is concerned solely with the antitoxin response to different immunizing procedures. No attempt is made to prove that any one procedure is the procedure of choice for routine immunization against diphtheria, and for two reasons: (1) The ultimate basis for the evaluation of any immunization method is whether or not it protects against diphtheria, and not necessarily whether or not it confers Schick negativity or raises the antitoxin level to any definite point; (2) It is entirely possible that a procedure which results in a lower level of antitoxin than some other may still be the method of choice from the public health standpoint. That is, it might be less expensive, be easier to administer, and confer a high enough percentage of immunity to be the most efficient use of the public health dollar in prevention of diphtheria. It may be a question of striking a balance between the conferring of the highest possible immunity to the individual on the one hand, and the reduction of diphtheria by conferring a lower but sufficient level of immunity to the community as a whole on the other.

The fact that no abscesses or severe reactions have followed the 2 injections of alum precipitated toxoid augurs well for the future of this method of immunization.

In most studies of a diphtheria immunizing procedure the Schick test is used. On the other hand, in much of the routine immunization a pre-Schick test is not used and probably will be used less and less in the future as pre-school immunization increases. Thus, since the Schick test may possibly have an antigenic effect, it becomes important from the practical point of view to evaluate diphtheria immunization in the absence of the Schick test, as done in this study.

FitzGerald, et al.⁶ report a better antitoxin response to 3 doses of fluid toxoid than to 2 injections of alum precipitated toxoid, just the opposite of our results. There is no significant difference between their results and ours with 2 doses of alum precipitated toxoid. There is a significant difference between their results and ours with 3 injections of fluid toxoid, our results being definitely lower than theirs. Perhaps this is due to a difference in the toxoids used, but it may be unsound to compare their fluid toxoid results with ours or with their own alum precipitated toxoid results since their 3 dose fluid toxoid results are based on those children who were originally Schick positive and not on the basis of those who had originally no titratable antitoxin. In other words, in contrast to their other groups (and to ours) their 3 dose fluid toxoid group had the benefit of the stimulus from a Schick test, and also might perhaps have contained some children who gave positive Schick tests but had titratable antitoxin below the .01 unit level and so would give marked response to any immunizing procedure. On the other hand, Fraser and Halpern³ in a study of 32 children observed a similar high response to 3 injections of

fluid toxoid. Here again some of the children received a pre-Schick test but all were titrated for antitoxin content before injection making the conditions more comparable to ours. Perhaps these latter results do point to some undetermined difference in the fluid toxoids used. It is conceivable that different technics or environments influence the results but one might expect these factors also to effect a difference in the alum precipitated toxoid results.

SUMMARY

The antitoxin response of children to several diphtheria immunization procedures has been determined. In the increasing order of the response they

induce, they are, under the conditions of our study: 1 dose fluid toxoid, 2 doses of fluid toxoid at 3 week interval, 1 dose of alum precipitated toxoid, 3 doses of fluid toxoid at 3 week interval, and 2 doses of alum precipitated toxoid at 3 week interval.

REFERENCES

1. Wells, D. M., Graham, A. H., and Havens, L. C. *A.J.P.H.*, 22:648-650 (June), 1932.
2. Graham, A. H., Murphree, L. R., and Gill, D. G. *J.A.M.A.*, 100:1096-7 (Apr.), 1933.
3. Fraser, D. T., and Halpern, K. C. *Canad. Pub. Health J.*, 26:469 (Oct.), 1935.
4. Straus, H. W. *J. Lab. & Clin. Med.*, 22:893 (June), 1937.
5. Jensen, Claus. *Proc. Roy. Soc. Med.*, 30:71 102 (July), 1937.
6. FitzGerald, J. G., Fraser, D. T., McKinnon, N. E., and Ross, M. A. *Bull. New York Acad. Med.*, 14:566 (Sept.), 1938.

Tribute to a Public-Spirited Physician

Legend on a Memorial Statue, St. Paul's Cathedral, London, England

William Babington, M.D., F.R.S., Fellow of the Royal College of Physicians, born May 21, 1756, died April 29, 1833. "Eminently distinguished for science, beloved for the simplicity of his manners and the benevolence of his heart, respected for his inflexible integrity and his pure and unaffected piety. In all the relations of his professional life he was sagacious, candid, diligent and humane; firm in his purpose, gentle in execution; justly confident

in his own judgment, yet generously open to the opinion of others. Liberal and indulgent to his brethren but ever mindful of his duty to the public.

"To record their admiration of so rare a union of intellectual excellence and moral worth and to extend to future generations the salutary influence which his living example can no longer diffuse, this monument has been erected by the public subscription of his contemporaries. A.D. 1837."

Asbestosis*

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ASBESTOS is well adapted for use as a textile material because of its fibrous nature. On account of this, as well as its non-combustible and excellent insulating properties, it has come to be used in ever increasing quantities during the past 20 years. Hence, it is not surprising that Gloyne and Merewether¹ should refer to pulmonary asbestosis as a "modern disease."

The first record of a case of asbestosis seems to have been made by Montague Murray in 1900. The first complete description of the disease and of the "curious bodies" seen in lung tissue and sputum appeared in 1927 when Cooke² and McDonald³ reported 2 cases of asbestosis and listed their reasons for believing that asbestosis bodies originate from asbestos fibers that reach the lungs. Their papers aroused general interest in the subject and numerous others appeared soon afterward. Hoffman⁴ appears to have been the first American to call attention to the magnitude of the asbestosis problem. In 1918 he reported that 13 deaths from asbestosis had occurred among asbestos textile workers, and about the same time Pancoast, Miller, and Landis⁵ reported on 17 cases of asbestosis. Mills's⁶ paper was the first

pathological report on asbestosis published in the United States, and in the same year, 1930, Lynch and Smith⁷ reported on asbestosis bodies found in the sputum of asbestos workers.

The Public Health Service was requested by the State Board of Health and the Industrial Commission (Administrator of the Workmen's Compensation Act) of North Carolina to assist them in making an engineering and medical study of the health hazards in the asbestos textile industry of that state. The objectives of this study were:

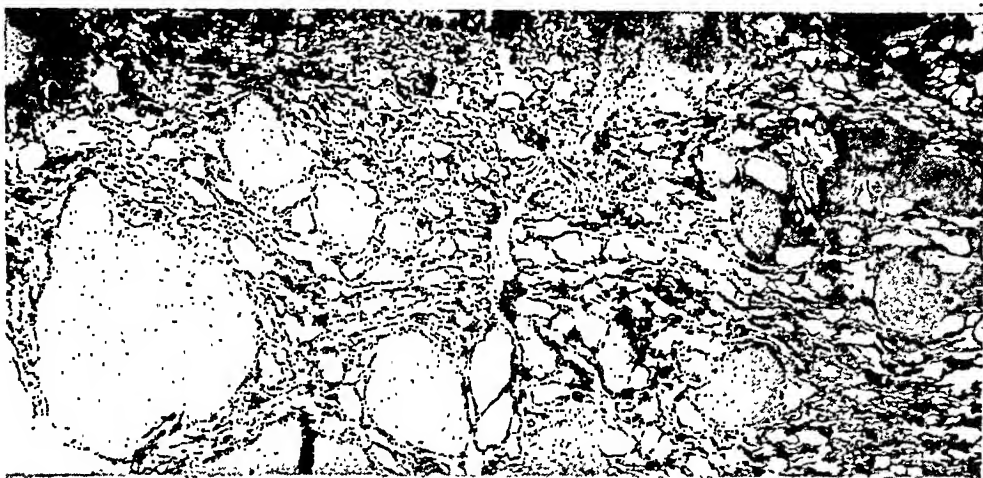
1. To make a medical study of the effects of long-continued inhalation of asbestos dust on the human body.
2. To identify the manufacturing processes that create dust, and to recommend practices for reducing the dust exposure of workers.
3. To find out what concentrations of asbestos dust can be tolerated without injury. It is the purpose of this paper to review briefly the principal findings of this study.⁸

ENGINEERING FINDINGS

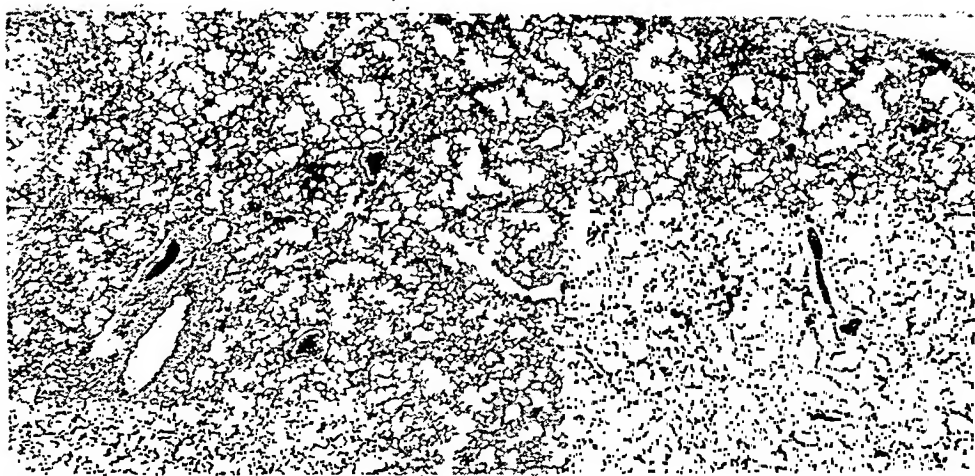
The main asbestos raw material used for textiles is Canadian chrysotile, which is a hydrated magnesium silicate containing no quartz.

The textile manipulations of asbestos are very similar to the production of cotton or woolen goods. The crude fiber is sent first to the preparation department, then, in the order named, to the carding machines, spinning frames, winding bobbins, twisting ma-

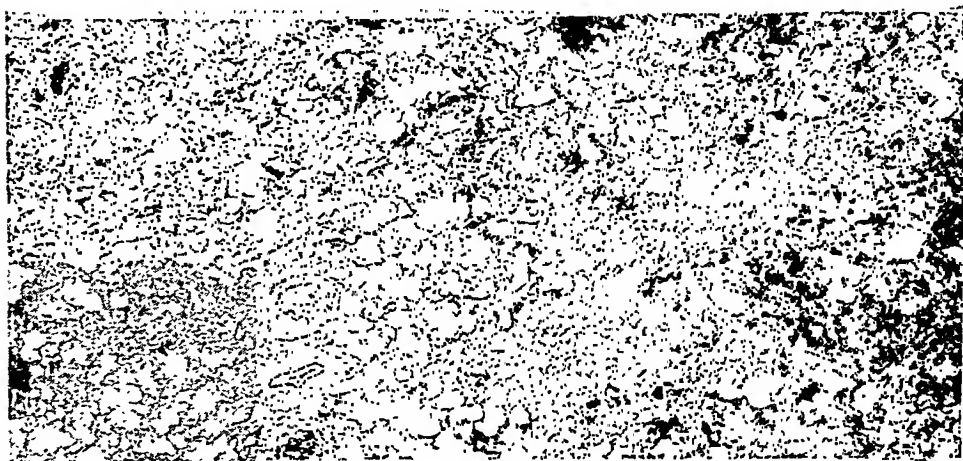
* Read before the Industrial Hygiene Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.



SILICOSIS



NORMAL



ASBESTOSIS

FIGURE I—Photomicrographs of Lung Sections Showing the Presence of Nodular Fibrosis and Emphysema in a Silicotic Lung and Diffuse Fibrosis and Emphysema in an Asbestotic Lung. A Section of a Normal Lung Is Shown for Comparison. Magnification 16 X.

TABLE I

Summary of Results Showing the Exposure of Asbestos Textile Workers Under Controlled and Uncontrolled Working Conditions

<i>Equipment</i>	<i>Number of Duct Connections</i>	<i>Volume of Air Handled (CFM)</i>	<i>Dust Concentration With Exhaust (MPPCF)</i>	<i>Dust Concentration Without Exhaust</i>
Willowing (opening)	* 2	625-1,000	3.6	11.1-36.0
Piling †	1	1,025	2.0	5.4
Picking	3	2,570	6.7	34.3-74.3
Carding (primary)	3	1,420	2.0	72.3
Carding (roving)	4	1,440		
Spooling	‡ 1	46.5	2.9	13.1
Weaving (broadloom)	2	1,300	.7	4.7-49.7
Brusher calenderer	3	1,650	1.0	11.1

* Equipped with pneumatic conveyor.

† Exhausted bin or compartment.

‡ Individual cone for each spool and connected to exhaust manifold.

chines, spooling frames, and finally to the looms and miscellaneous fabricating devices.

In all, 242 dust counts were made in estimating the exposure of these asbestos workers. Only summary engineering findings, or dust concentrations as they relate to medical findings, will be discussed. Summarized results of dust concentrations under controlled and uncontrolled conditions appear in Table I. It will be noted that 74.3 million particles per cubic foot (m.p.p.c.f.) is the maximum concentration of dust encountered. Even this maximum figure is much lower than is frequently encountered in other siliceous trades where it has not been uncommon to encounter maximum dust concentrations of 1,000 m.p.p.c.f.

The dust in asbestos plants is made

up of particulate matter and fibers. The median size in microns of particulate matter ranged from 1.85 to 2.40. Particles were smallest in the carding and preparation processes, and largest in weaving. The median length of fibers in microns ranged from 7 to 16.3. As might be expected, the longest (400 μ) were noted in case of weaving and the shortest in preparation.

TABLE II

Median Length of Fibers Sampled With an Owens Jet Apparatus

<i>Activity</i>	<i>Median Length of Fibers in Microns</i>
Willowing	7.0
Picking	9.5
Carding	8.8
Twisting	12.8
Weaving (broadloom)	16.3

TABLE III

Size Frequency Distribution of Particulate Dust Suspended in the Air of Asbestos Textile Plants

<i>Nature of Process Where Sample Was Taken</i>	<i>Median Size (in Microns)</i>	<i>Geometric Standard Deviation</i>	<i>Percentage Frequency of Each Particle Size Group (in Microns)</i>											<i>Total</i>
			<i>0.49 to</i>	<i>0.5 to</i>	<i>1 to</i>	<i>1.5 to</i>	<i>2 to</i>	<i>2.5 to</i>	<i>3 to</i>	<i>3.5 to</i>	<i>4 to</i>	<i>4.5 to</i>	<i>5 or more</i>	
Preparation	1.85	1.56	5	21	37	22	10	4	2	1	0	0	0	100
Carding	1.35	1.57	1	9	24	25	9	16	4	5	1	3	3	100
Mule spinning	1.80	1.33	0	1	25	58	28	4	1	1	1	0	1	100
Twisting	1.22	1.74	5	30	24	14	9	5	4	5	0	1	3	100
Weaving (broadcloth)	1.55	1.31	1	4	43	27	10	5	2	3	4	0	3	100
Weaving (tape)	2.40	1.64	0	3	11	24	14	12	7	13	7	5	6	100

The significance of dust concentrations and physical characteristics of these air contaminants will be referred to in the course of subsequent discussion.

The workers who were found particularly liable to develop severe forms of asbestosis were the willowers, pickers, carders, mule and ring spinners, twisters, and cloth weavers. Their exposure was found to be as follows:

	Dust concentration MPPCF
Willowers	11.1-36.0
Pickers	34.3-74.3
Carders and tenders	29.1
Mule spinners	2.6- 7.9
Ring spinners	3.2- 8.3
Twisters	3.2-13.2
Cloth weavers	
Dry	4.7-49.7
Wet	4.7-11.1

MEDICAL FINDINGS

Medical examinations were made of 541 men and women representing practically all the employees at the time of study. Five-sixths of them were native born Americans of Anglo-Saxon stock and the remainder were Negro males. The three factories studied had been in operation from 6 to 16 years. About 15 months before the study, approximately 150 workers were replaced by new ones with little or no asbestos experience. As a consequence, there was an abnormally large percentage of workers with less than 5 years' employment in the asbestos textile industry and an abnormally small percentage who had worked 10 years or more in the industry. More than 200 had worked at comparable occupations in cotton or woolen textile plants, but exposures to pneumoconiosis producing dusts were inconsequential.

Characteristics of asbestosis—Pulmonary asbestosis was the principal physical defect found on examining the 541 persons. This disease, a form of pneumoconiosis caused by long continued inhalation of asbestos dust, is

characterized pathologically by diffuse interstitial pulmonary fibrosis and the presence of asbestosis bodies in the lungs. Clinically, the chief symptoms are progressive dyspnea, variable cough, substernal chest pain, blood streaked sputum, decreased chest expansion, emaciation, weakness, clubbed fingers, or curved nails. Late in the disease, the dyspnea becomes distressing, cyanosis may occur, and there may be severe paroxysms of coughing productive of tenacious sputum. The characteristic chest X-ray shows granular or ground glass markings with more or less obliteration of usual linear pulmonic markings, localized in mid-lung and bases. The grainy appearance may become quite generalized with evidence of emphysema usually in the apices. Nodular or nodulo-conglomerate shadows of silicosis are not observed, but whether this is due to a peculiarity of asbestos dust or to rare occurrence of extremely high dust exposures, it is impossible to say. Shaginess of the heart shadow is not infrequently observed and seems to be most common in workers exposed to a high proportion of fiber (e.g., twisting, broadcloth weaving). By fluoroscopy, diminished excursion of diaphragm is seen. Peaking deformities of diaphragm, however, occur less frequently than in silicosis.

Asbestosis bodies found in the lungs and sputum are characteristic. There is good evidence that these bodies originate as a cellular response to inhaled fibers.⁹ Asbestosis bodies consist of a core of asbestos fiber surrounded by iron-containing protein deposits. They are golden yellow in color, and do not stain with ordinary histologic stains but become brilliant blue when treated with potassium ferrocyanide. They are variable in form and size and characteristically are slender, elongated, segmented structures with bulbous ends which give them a dumbbell or drum-

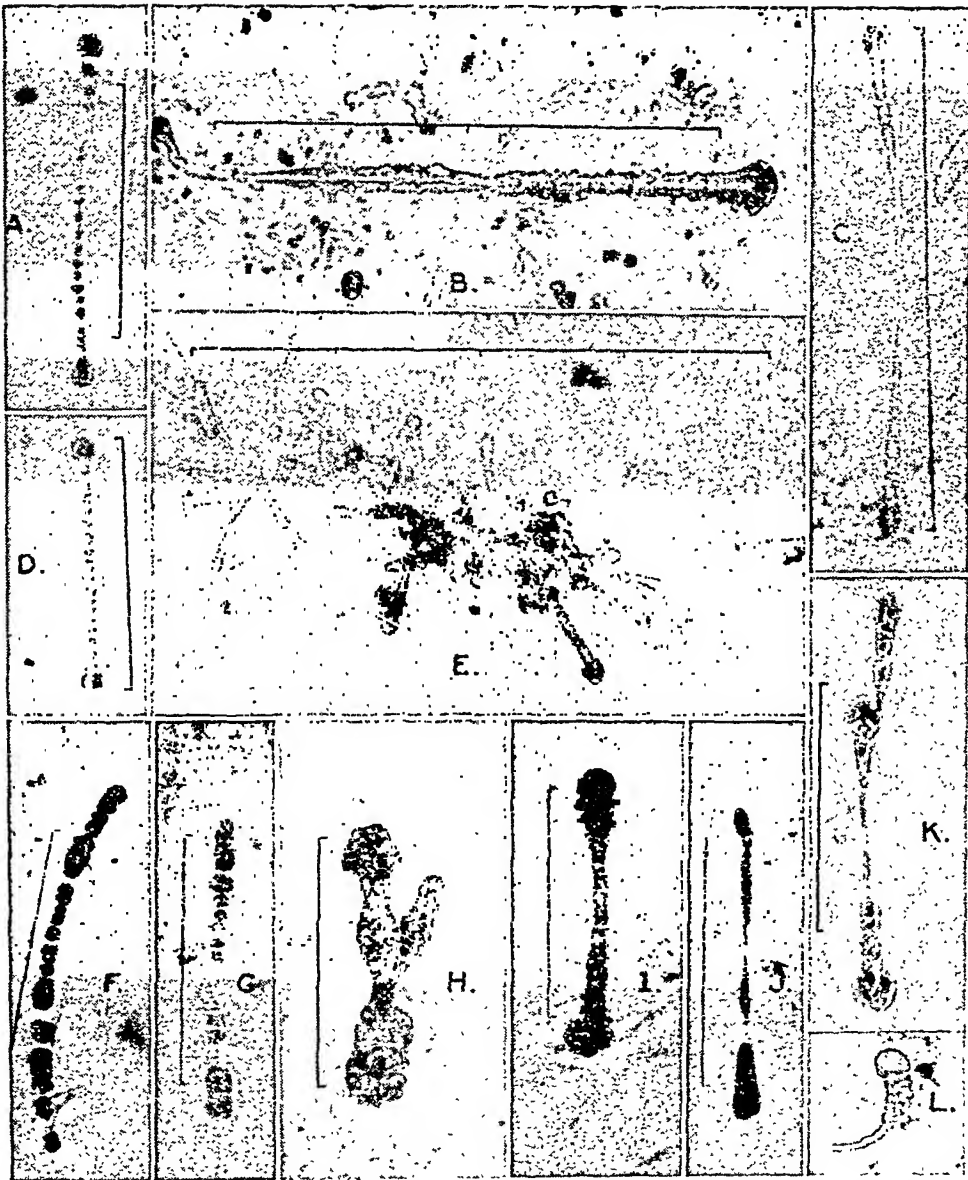


FIGURE II—Photomicrographs of Asbestosis Bodies Found in Sputum. Enlarged 530 Times (Except E, Which Is Enlarged 310 Times). A Scale, Ruled in Units of 50 Microns, Has Been Drawn Beside Each Asbestosis Body.

stick shape (Figure II). Occasionally a forked or Y-shaped body is observed. They range from 10 to 180 μ in length, averaging about 35 μ .

It has been suggested that damage to the lungs occurs while the body is being formed, but once the body is formed the fiber in the core is rendered inert by its coating of iron.¹⁰ The finding in the sputum of clumped asbestosis bodies in radial pattern or rosette

(Figure II E), which is common in lung sections, has been suggested by Stewart, Tattersall, and Haddow¹¹ as a clear indication of disintegration of lung tissue whether by a process of simple suppurative broncho-pneumonia, or as a result of secondary tuberculous infection. In either case, they feel that it strongly indicates a definite underlying asbestosis.

On single sputum specimen analysis

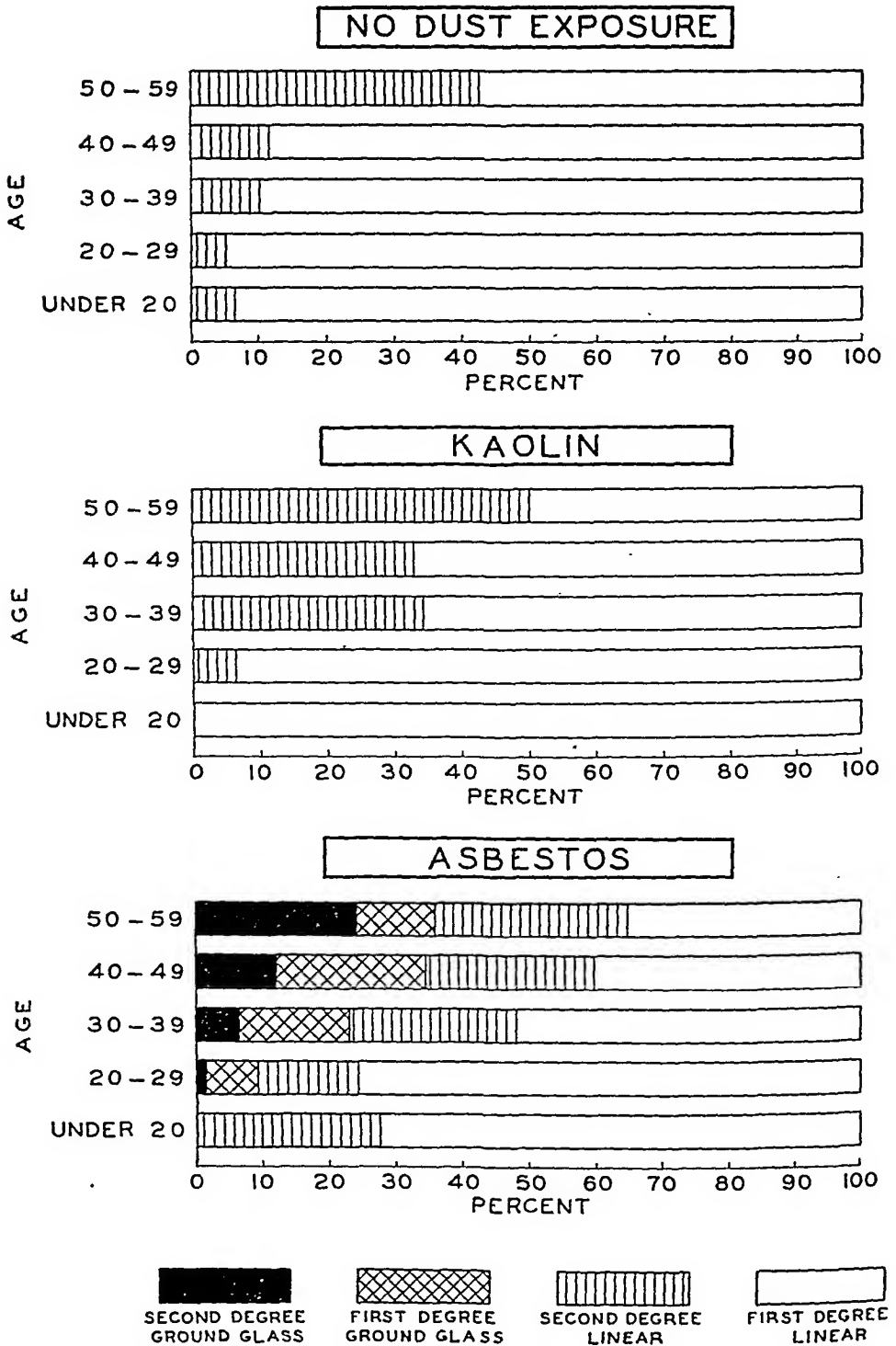


FIGURE III—Percentage of Males, Classified by Age, Who Had Certain Lung-Field Markings; 229 Men Had No Previous Industrial Dust Exposure, 80 Had Been Exposed to Kaolin Dust, and 357 Had Been Exposed to Asbestos Dust.

of each case, the incidence of asbestosis bodies increased with increasing dust exposure. They were found in sputum of 46.9 per cent persons whose condition was diagnosed as asbestosis, whereas 24.3 per cent of essentially normal asbestos-exposed persons had bodies in the sputum. They were not observed in any of the persons surveyed with less than 3 months' exposure. Since they may be found in the sputum before significant fibrotic changes have occurred, their presence is interpreted as merely showing evidence of exposure.

X-ray interpretations—During the development of a typical pneumoconiosis, the lung field appearances of chest roentgenograms pass through a series of rather well defined phases. Beginning with the normal adult film with its linear pulmonic markings, the first next appreciable change is an exaggeration of these markings. Then a ground glass or granular appearance is noted which gradually obliterates the linear markings, followed by nodular and nodulo-conglomerate markings. The lung field appearances in asbestosis do not appear to proceed beyond the ground glass or granular phase. Classification of all films was made according to phases. The apparent small amount of involvement of lungs makes it difficult to evaluate the severity of the case from an X-ray film only. The difficulties of interpretation of the chest films emphasize the importance of careful technic. As a form of pneumoconiosis, asbestosis strikingly indicates the necessity for clinical study of a case before diagnosis can be made. The film of a patient severely ill with asbestosis may have markings which would appear insignificant alongside a typical silicotic film of a man who is actively at work.

In the interpretation of asbestotic films the physician must be aware of exaggerated markings attributable to advancing age. This is illustrated in Figure III. One group comprising 229

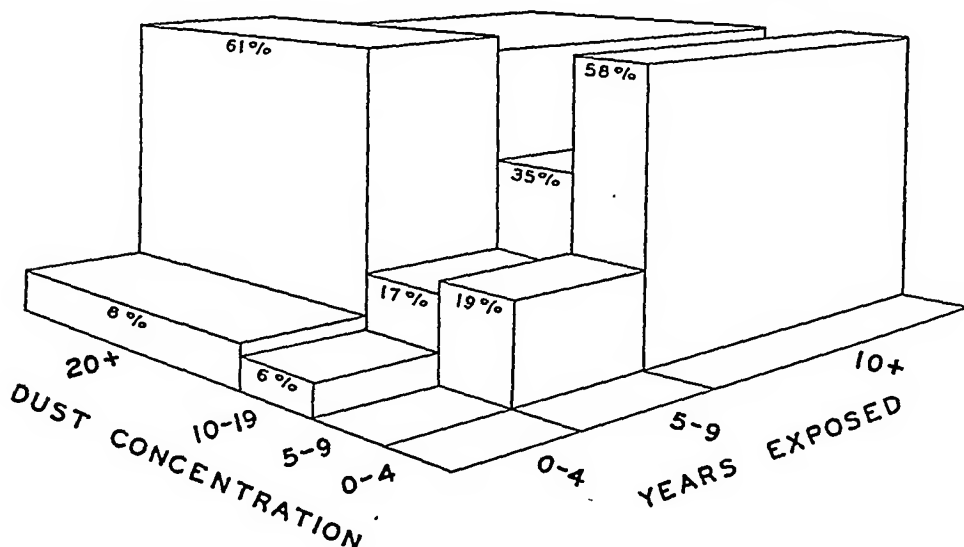
men had never been employed in a dusty trade; the other included 80 men engaged in mining and refining of kaolin by wet methods. The percentage of men who have second degree exaggeration of linear lung markings increases with advancing age. It is significant that in this entire group of 309 men there were no cases of ground glass lung field markings, even though this change is observed in the asbestos workers. It appears that the reason why the incidence of the ground glass type of pulmonic marking is correlated with age is that older people have been exposed to dust for the longest time.

Occurrence of asbestotic lung changes—In Figure IV the heights of vertical bars represent the percentages of asbestos workers in different exposure groups who had ground glass lung field markings of either first or second degree. Seventy-six controls have been excluded from this tabulation and a number of workers whose dust exposure was not known have also been omitted.

Considering the four dust exposure groups, one at a time, there is a consistent and regular increase in the percentage of persons with these ground glass markings with increasing length of employment. Age, of course, also increases with length of employment, but these fibrotic changes cannot be ascribed to advancing age because the previous figure (III) showed that fibrotic changes of this degree are not to be expected in workmen of comparable age who are not exposed to siliceous dusts. Note the absence of cases with ground glass markings in the group exposed to less than 5 m.p.p.c.f.

Obviously, there are great differences between individuals in the time that elapses from their first exposure to asbestos dust and the time fibrotic evidence is observed in the X-ray film. In some persons this was much less than 5 years and in others it appears to be more than 10. Some of the difference

FIGURE IV—Percentage of Asbestos Textile Workers, Classified by Average Dust Concentration (Measured in Million Particles per cu. ft.) and Duration of Exposure, Found to Have Ground-Glass Lung-Field Markings.



is probably due to total amount of asbestos dust inhaled. Difference in amount of physical exertion may play an important rôle—a person in a sedentary job having a smaller need for oxygen inhales less air and consequently fewer particles of asbestos.

It was noted that the relation between dust exposure and the incidence of ground glass lung field markings was not a simple one. Even when length of employment was disregarded, it was found that incidence of these markings

was proportionately lower at 10 to 19.9 m.p.c.f. than it was at the next higher or next lower concentrations. Although it is probable that these differences represented sampling errors due to small numbers of exposed persons, it may be that asbestos fiber excites a different and possibly more severe reaction than asbestos particles.

On account of large labor turnover, as well as the short time that the plants had been in operation, no exact estimate of incidence of asbestosis can

TABLE IV

*Occurrence of Asbestosis in Relation to Dust Concentration and Length of Employment
Percentage With Asbestosis*

Dust Exposure, Million Particles per Cubic Foot		Years in Asbestos Industry		
		0 to 4.9	5 to 9.9	Over 10
0 to 4.9.....	Affected	2	1	0
	Exposed	84	19	5
	Percentage	2%	5%	0%
5 to 9.9.....	Affected	0	6	13
	Exposed	70	37	19
	Percentage	0%	16%	68%
Over 10.....	Affected	8	22	21
	Exposed	134	43	36
	Percentage	6%	51%	58%

be made. Table IV shows, however, that the percentage of persons with asbestosis increases greatly with increasing length of employment. Lanza, McConnell, and Fehnel¹² reported a similar trend. The incidence also increases with increasing dust concentration. For the reason that there are but few cases with more than 15 years' exposure, the percentages in Table IV are necessarily minimal estimates of prevalence of asbestosis even though several of the former employees are included.

SAFE LIMITS OF EXPOSURE TO ASBESTOS DUST

For practical purposes it is useful to have a definition of safe working conditions. Ideally, a threshold concentration of dust should be the highest dust concentration that would not produce pneumoconiosis in originally healthy workmen during their entire working life. Below 2.5 m.p.p.c.f. the interpretation of Table IV offered no difficulties, since none of 39 persons exposed to that concentration had asbestosis, although only 6 had been employed more than 5 years. Three doubtful cases of asbestosis fell in range 2.5 to 4.9 m.p.p.c.f.

Because clean-cut cases of asbestosis

TABLE V

Percentages of Workers Exposed to Certain Concentrations of Asbestos Dust in Asbestos Textile Factories Where Dust Control Measures Are Used to a Limited Extent and in Factories Where Effective Dust Control Is Practised

Dust Concentration Million Particles per Cubic Foot	Limited Use of Dust- Control Measures *	Extensive Use of Dust- Control Measures †
Over 10	48	7
5 to 9.9	28	17
2.5 to 4.9	15	32
Under 2.5	9	44

* Data from Table IV.

† Data from reference 13.

were found in dust concentrations exceeding 5 m.p.p.c.f., and because they were not found at lower concentrations, 5 m.p.p.c.f. may be regarded tentatively as the threshold value for asbestos-dust exposure.

A supplemental engineering study¹³ was made in an asbestos textile factory in which dust control equipment had recently been installed. This showed that means are already available for reducing the dust exposure of a majority of asbestos textile workers to less than 5 m.p.p.c.f. The basis of this control was exhaust ventilation near source of dust.

CONCLUSIONS

As in other forms of pneumoconiosis, occupational history, and clinical and X-ray (or pathologic) findings must be in harmony before a sound diagnosis can be made. The occupational history should be a reflection of manufacturing processes since the job designation refers to a stage in manufacture. The occupations which were found particularly liable to induce severe forms of asbestosis were willow, pick, card, spin, twist, and cloth weave. Confirmation of the hazardous nature of some of these occupations is the frequency with which the occupational designation of carder, weaver, or spinner is encountered in autopsy reports of cases.¹⁴⁻¹⁸ The following are the outstanding findings determined in this study:

1. In a study of 541 employees of North Carolina textile mills, pulmonary asbestosis was the principal physical defect found.
2. The most serious forms of the disease were observed in carders, spinners, weavers, twisters, willowers, and pickers.
3. Exposures ranged from 0.10 to 76 m.p.p.c.f.
4. Dust contaminants of air in asbestos textile plants are both particulate and fibrous.
5. It is imperative that findings of occupational history, clinical examination, and X-ray film all be considered in making diagnosis of a case.
6. Definite clinical and roentgenographic

evidence of asbestosis is observed in exposed persons after 5 to 10 years of work in exposures exceeding 5 m.p.p.c.f.

7. It appears that if asbestos dust concentrations in the air breathed are kept below 5 m.p.p.c.f. new cases of asbestosis will not appear.

8. Methods for controlling the dust below this tentative threshold are already available for most of the processes in the industry.

REFERENCES

1. Gloyne, S. R., and Merewether, E. R. A. *Asbestos. Occupation and Health* (Suppl.), International Labour Office, Geneva, 1938.
2. Cooke, W. E. Pulmonary Asbestosis. *Brit. M. J.*, 2:1024-1025, 1927.
3. McDonald, Stuart. Histology of Pulmonary Asbestosis. *Brit. M. J.*, 2:1025-1026, 1927.
4. Hoffman, F. L. Mortality from Respiratory Diseases in Dusty Trades (Inorganic Dusts). *Bull. U. S. Bur. Lab. Stat. No. 231*, 1918, pp. 176-180.
5. Pancoast, H. K., Miller, T. G., and Landis, H. R. M. A Roentgenologic Study of the Effects of Dust Inhalation Upon the Lungs. *Tr. A. Am. Physicians*, 32:97-108, 1917.
6. Mills, R. G. Pulmonary Asbestosis: Report of a Case. *Minnesota Med.*, 13:495-499, 1930.
7. Lynch, K. M., and Smith, W. A. Asbestosis Bodies in Sputum and Lung. *J.A.M.A.*, 95:659-661, 1930.
8. A Study of Asbestosis in the Asbestos Textile Industry. *Pub. Health Bull. No. 241*, Aug., 1938.
9. Gloyne, S. R. The Asbestosis Body. *Lancet*, 1:1351-1356 (June 25), 1932; Sundius, N., and Bygden, A. Der Staubinhalt einer Asbestosislunge und die Beschaffenheit der sogenannten Asbestosiskörperchen. *Archiv. f. Gewerbepath. u. Gewerbehyg.*, 8:26-70, 1937; Gloyne, S. R. The Morbid Anatomy and Histology of Asbestosis. *Tubercle*, 14:445-451; 493-497; 550-558, 1933.
10. Kettle, E. H. The Interstitial Reactions Caused by Various Dusts and Their Influence on Tuberculous Infections. *J. Path. & Bact.*, 35:395-405, 1932.
11. Stewart, M. J., Tattersall, N., and Haddow, A. C. On the Occurrence of Clumps of Asbestosis Bodies in the Sputum of Asbestos Workers. *J. Path. & Bact.*, 35:737-741, 1932.
12. Lanza, A. J., McConnell, W. J., and Fehnel, J. W. Effects of the Inhalation of Asbestos Dust on the Lungs of Asbestos Workers. *Pub. Health Rep.*, 50:1-12, 1935. *Reprint No. 1665*.
13. Page, R. T., and Bloomfield, J. J. A Study of Dust Control Methods in an Asbestos Fabricating Plant. *Pub. Health Rep.*, 52 (Nov. 26), 1937. *Reprint No. 1883*.
14. Lynch, K. M., and Smith, W. A. Pulmonary Asbestosis II. *Am. Rev. Tuberc.*, 23:643-660, 1931.
15. Egbert, D. S. Pulmonary Asbestosis. *Am. Rev. Tuberc.*, 31:25-34, 1935.
16. Stock, G. A. Pulmonary Asbestosis. *M. Bull. Vet. Admin.*, 10:126-129, 1933.
17. White, T. P. Pulmonary Asbestosis. *Tr. Med. Soc. North Carolina*, 1935, pp. 259-262.
18. Lynch, K. M., and Smith, W. A. Carcinoma of Lung in Asbesto-silicosis. *Am. J. Cancer*, 24: 56-64, 1935.

Factors Influencing Nonspecific Resistance to Infection^{*}

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THE study of experimental infections in pure lines of mice has made possible the separate evaluation of host factors and parasite factors influencing the course and outcome of acute infectious disease.¹ When the parasite factors, including strain, virulence, dosage, and portal of entry, are maintained constant, the survival of the host following inoculation is conditioned by heredity, nutrition, and by environmental factors directly affecting the host.

In a previous report the resistance of young mice to mouse typhoid was shown to be greatly influenced by the diet of the mothers during pregnancy and lactation.² The environmental factors were maintained uniform by isolation of the inoculated mice in individual cages in an air-conditioned room. The purpose of this paper is to review the effects of heredity and of nutrition upon resistance to infection and to present a method for the evaluation of natural resistance independent of the development of specific immunity.

The results here presented are de-

rived from the study of 2,868 mice inoculated by stomach tube, at the age of 8-9 weeks, with a standard dose of *Salmonella enteritidis*. The technic employed has been described in a previous publication.²

The virulence of the test organism for this particular host has remained unchanged through these experiments. When the genetic background, the dietary background, and the external environment of the host were kept constant, the survival curves for groups of 20 mice were reproducible within the limits of statistical variation (Figure I). The first deaths occurred about the 6th day after inoculation and the point of 50 per cent mortality was reached on the 8th to 9th day. The mean survival at the end of 28 days was from 0 to 15 per cent. The uniformity of these results with groups of mice of the same genetic and dietary background indicates the constancy of host and parasite factors in these experiments. There is no evidence of seasonal variation in the periods covered (October to May and September to March).

The course of the experimental infection in the organs and tissues has been followed by bacteriological studies^{*} of mice killed on successive days following intrastomachal inocu-

^{*}Read before the Epidemiology Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 26, 1938.

† Since September, 1938, at the School of Hygiene and Public Health, University of Michigan, Ann Arbor, Mich.

^{*}These studies were suggested by the work of Madsen (Flexner Lectures, Series No. 5, 1937).

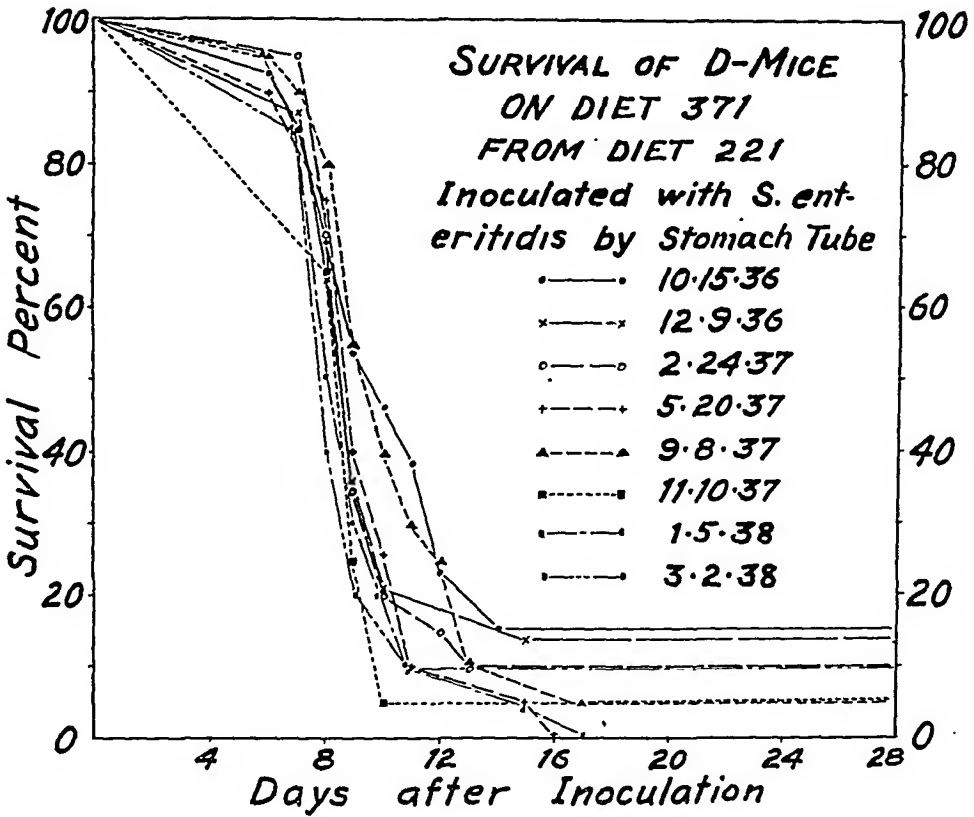


FIGURE I—Successive virulence tests on *Salmonella enteritidis*

lation. The organism was found in the mesenteric lymph nodes 2 days after inoculation and reached the blood stream on the 3rd day. It successively invaded the spleen, axillary and submaxillary lymph nodes, liver, and kid-

TABLE I

Effect of Selective Breeding and Selective Nutrition on Natural Resistance to Infection

Type of Experiment	Line of Mice	Maternal Diet	Contempo- raneous Diet	No. of Mice Inoculated	Survival		Mean Sur- vival Time in Days ¹
					No.	Per cent	
Standard Control (Figs. II, III, VI)	D	200	371	100	33	33.0	11.2±0.33
Selective Breeding (Figs. II & III)	A	200	212	100	91	91.0	22.0±0.78
	B	200	212	67	1	1.5	7.2±0.18
Selective Nutrition:							
(a) Contemporaneous Diet (Fig. IV)	A	200	212	42	37	88.1	22.2±1.11
	A	200	241, 245	27	11	40.8	12.8±1.21
(b) Maternal Diet (Fig. VI)	D	200b ²	371	66	52	78.8	16.1±0.60
	D	221	371	100	7	7.0	9.1±0.16

1. The Mean Survival Time with its standard deviation was derived by the graphic method illustrated in Figure III. It is independent of the development of immunity.

2. Diet 200b is Diet 200 continued as a breeding diet through four generations.

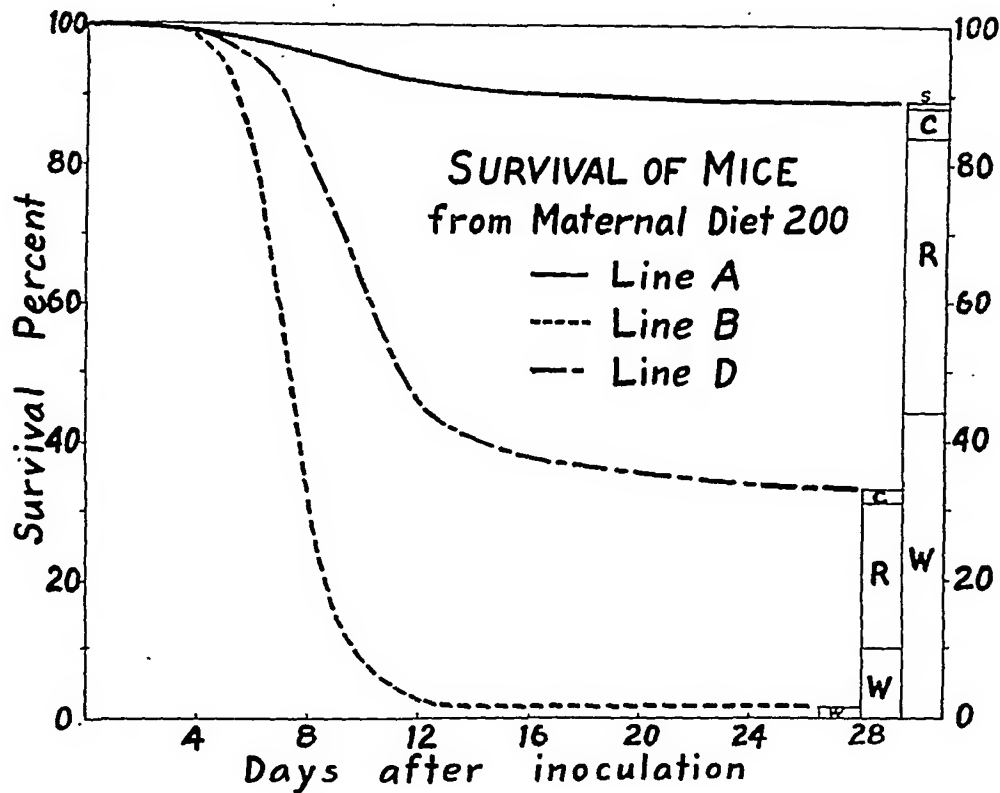


FIGURE II—The influence of heredity upon resistance to infection

neys. The organism tended to disappear from the alimentary tract of those that survived 10 days or more, although reinfection of the intestine occurred by way of the bile. The mesenteric nodes remained solidly infected to the 30th day. The organism was recovered from the spleens of 61

per cent of the survivors necropsied 31 to 60 days after inoculation, and of 29 per cent of those examined 61 to 90 days after inoculation. Included in these survivors are those from groups of high resistance, many of which had shown no symptoms of infection, but which, nevertheless, continued to carry

TABLE II
*Composition of Diets per 100 Calories
By Chemical Analysis of the Ingredients*

Diet	Calories			Milligrams					
	Pro.	Carb.	Fat	Ca	Mg	K	Na	P	Cl
Natural Foodstuffs									
200	16	68	16	118	19	152	62	90	98
221	16	59	25	105	13	199	136	139	232
Purified Food Elements:									
212	19	72	9	149	18	270	43	145	52
241	19	72	9	28	18	266	43	143	52
245	16	75	9	29	23	302	61	149	79
371	25	70	5	160	24	195	115	155	177

the organism in the spleen for long periods after inoculation.

A. HEREDITY AND HOST RESISTANCE

The rôle of heredity in resistance to infection has been demonstrated by Webster.^{3,4} By selective breeding, lines of mice were developed which respond characteristically to a given infective agent. Three of these pure lines, obtained originally from the Rockefeller Institute for Medical Research, have been studied in our laboratory. They are designated as follows:

Line A — Rockefeller Institute Resistant (BRVS)

Line B — Rockefeller Institute Susceptible (BSVR)

Line D — Swiss Mice (Unselected)

Lines A and D have reached the 8th generation in our laboratory. Line B was discontinued after the 3rd generation in order to permit more detailed study of the other two.

When tested by inoculation with *S. enteritidis* these three lines of mice gave responses similar to those obtained by Webster. In a series of experiments (Figure II) Line A gave 89 per cent survival at 28 days after inoculation, and 44 per cent came through the infection with no evidence of illness. The contrast offered by Line B is striking, for of the latter 50 per cent were dead by the 8th day and less than 2 per cent (one animal) survived to 28 days. These two lines were developed by selective breeding from the same

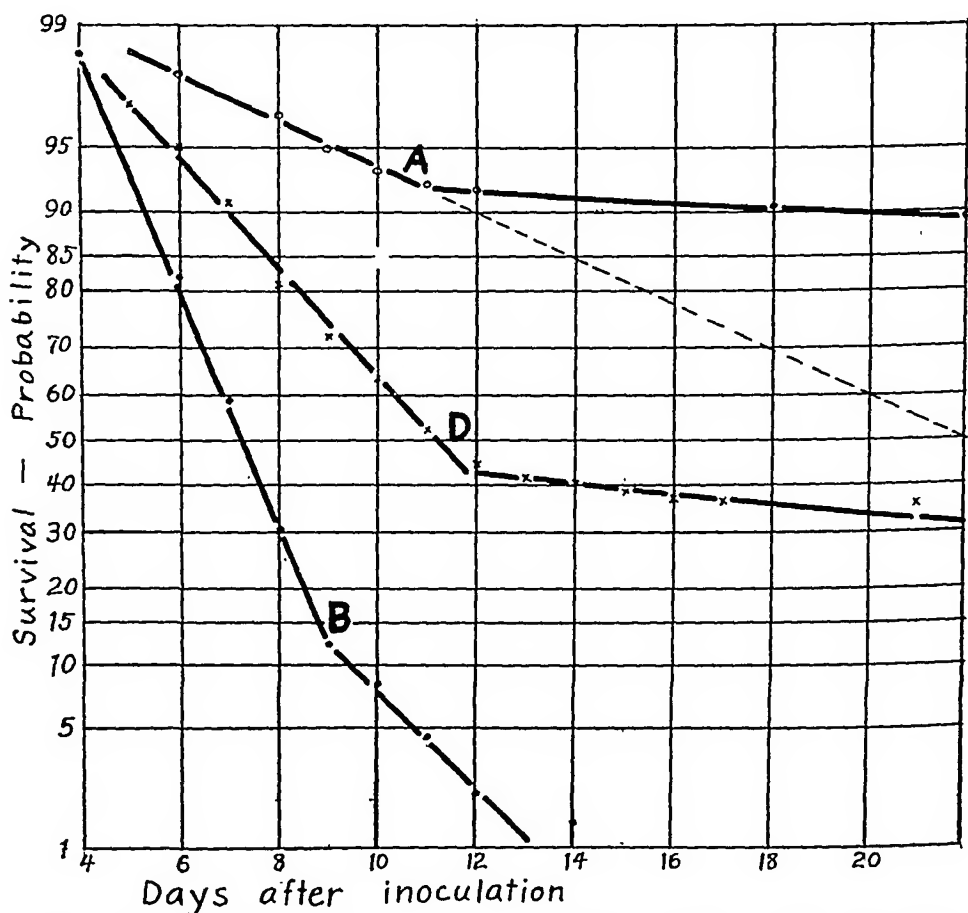


FIGURE III—Differentiation of natural resistance from acquired specific immunity. The survival data shown in Figure II is plotted on arithmetic-probability coordinates

original stock and therefore demonstrate the marked degree to which heredity may influence host resistance when all other factors are kept constant.

Line D is a genetically unselected line and shows, as may be expected, a survival rate intermediate between the Resistant and the Susceptible lines: namely, 33 per cent.

The sigmoid shape of these curves suggests that they may be curves of normal frequency distribution of deaths with respect to time.⁵ This can be tested by plotting the results on arithmetic probability paper (per cent survival against time after inoculation). A straight line relationship will then indicate a normal frequency distribution. When the survival curves for the three lines of mice are plotted thus, there results in each case a straight line bent or deflected near the middle (Figure III). The point of deflection is from 9 to 12 days after inoculation and corresponds in time to the rise of the antibody titer in the blood serum of the infected animals.

The first part of the curve is obviously that determined by the natural resistance of the previously unexposed population, whereas the deflection of the lower limb indicates a change (increase) in the resistance of those that have survived the first onslaught of the infection. This increase in resistance, 9 to 12 days after inoculation, may be due to the rise of specific immunity.*

Since the upper limb of the curve is that determined by the nonspecific resistance of the group we have only to follow this line to its intersection with the abscissa for 50 per cent survival to obtain the mean survival time

uninfluenced by specific immunity. When the upper limb does not extend to the 50 per cent abscissa, as with the Line A curve, it may be extrapolated to the point of intersection.

The mean survival time obtained in this way is a measure of nonspecific resistance which can be applied to any homogeneous population tested with a suitable pathogen under controlled conditions.

B. DIET AND HOST RESISTANCE

1. *The contemporaneous diet*—Host resistance is not readily influenced by the diet during or immediately preceding the period of infection. Changing the diet within rather wide limits from the normal, 2 weeks before inoculation, had little effect upon survival. This was indicated in Webster's work⁷ and is borne out by the recent results of Topley⁸ and Watson.⁹

Certain changes in the contemporaneous diet, however, have a marked effect upon nonspecific resistance. The level of mineral salts in the diet is a factor of considerable importance.¹⁰ When the level of inorganic elements was reduced to one-fourth the normal, 2 weeks before inoculation, the fatality rate in Line A mice was increased from 9 to 34 per cent.² Drastic reduction in dietary calcium likewise resulted in increased mortality. When the calcium content of the diet was reduced from 0.55 per cent to 0.10 per cent the fatality rate increased from 12 to 59 per 100 animals (Figure IV). Uninoculated control groups maintained upon each of these low mineral diets suffered no fatality over a 10 week period.

It is possible, therefore, to influence host resistance by making the contemporaneous diet insufficient or unbalanced with respect to mineral salts. Our attempts to produce similar depression of resistance in Line A mice by deprivation of vitamin A, of vitamin

* The agglutinin titer in the sera of survivors after 28 days was 1:80 or greater, while the sera of mice killed 8 days after inoculation gave no agglutination in 1:20 dilution.

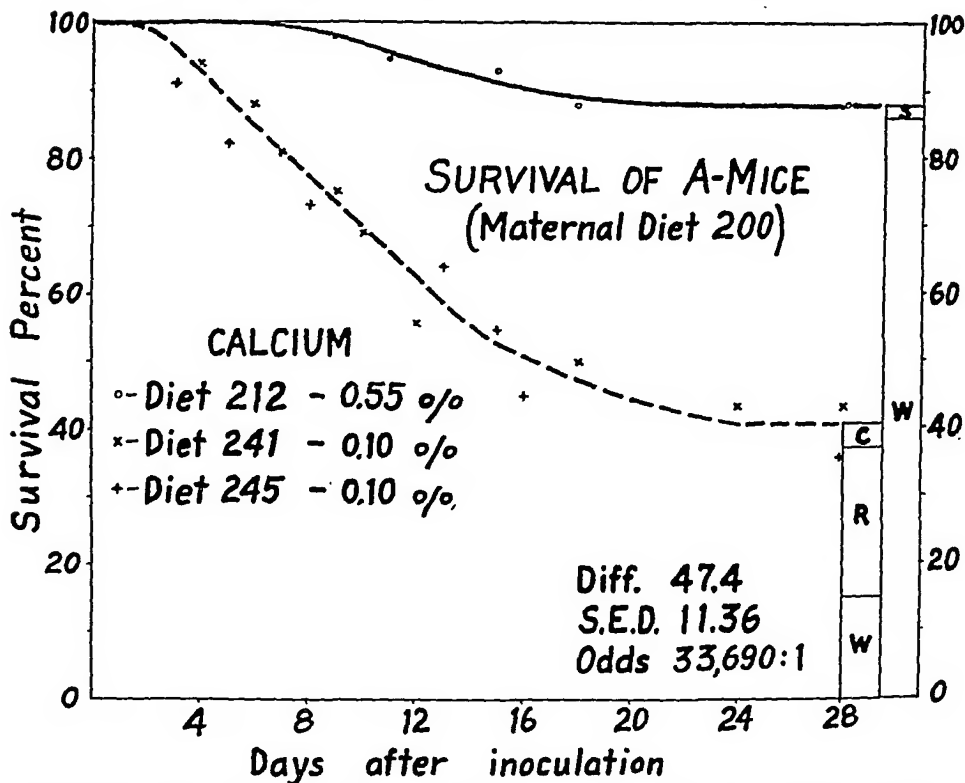


FIGURE IV—The influence of a marked alteration in the calcium content of the contemporaneous diet upon resistance to infection

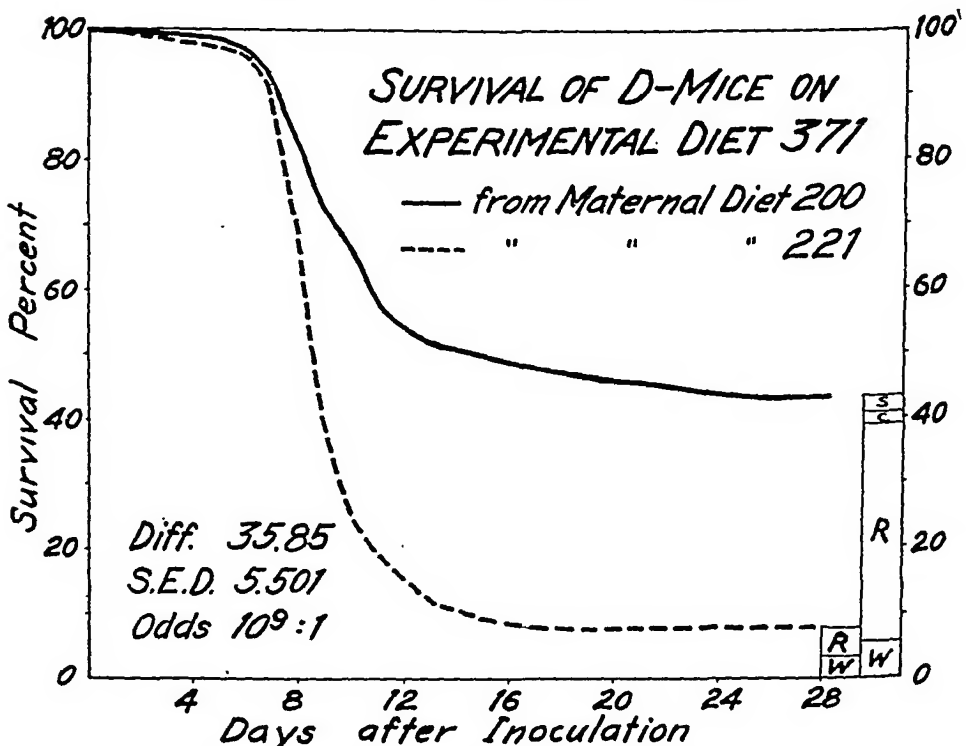


FIGURE V—The effect of the diet during pregnancy and lactation upon the resistance of the offspring

D, and of fat have failed.¹¹ This, together with the evidence of the importance of the maternal diet, suggests that modification of resistance is not readily effected through the contemporaneous diet.

2. *The maternal diet*—The diet of the mother during pregnancy is a factor of major importance in determining the resistance of the offspring to mouse typhoid infection.¹² In our experiments comparisons were made between a simple diet of three ingredients (Diet 221) and a mixture of ten ingredients (Diet 200). These two diets were almost equally satisfactory for the breeding and rearing of Line D mice. When the progenies from these two maternal diets were placed upon the same diet and tested by inoculation with *S. enteritidis* the survival of those born of mothers on the diet of ten ingredients was significantly greater than the survival of those born of mothers on the diet of three ingredients. Of those born on Diet 200, 47.1 per cent survived the infection, while of those born on Diet 221 only 11.8 per cent survived. The statistical significance is indicated by the odds of 3,671 to 1.

In subsequent experiments the progenies from these two maternal diets were changed to the same purified diet during the contemporaneous period in order to rule out any effect of gastrointestinal contents upon the initial growth of the organism. The results were similar (Figure V). Survival in the progenies born on Diet 200 was 43.4 per cent, while in those born on Diet 221 it was 7.8 per cent. Because of the large number of animals used the statistical significance is very high.

Both of these diets were adequate for normal growth and reproduction and, by the usual criteria of growth rate, size of litter, fertility, and weight of young at 10 and 25 days, were almost equally satisfactory. Chemical

analysis¹³ revealed a number of differences in composition but gave little clue to the essential factors.² But the progenies from mothers changed at mating to the diet of three ingredients (Diet 221) showed low resistance, whereas those from mothers placed at mating on the diet of 10 ingredients (Diet 200) showed high resistance to the test infection. The improvement in resistance was greater when the change to diet 200 was made 8 weeks or more before mating. Successive generations on the resistance-inducing diet showed progressive increase in survival percentage. The greatest increase in resistance (survival of 79 per cent as compared with 7 per cent) was obtained after three generations on the resistance-inducing diet (Figure VI).

These differences in the host resistance of young mice from the two maternal diets appear to be the result of differences in the nutrition of the mothers. The possibility of variations in the genetic constitution of Line D mice as a result of heterozygous matings cannot as yet be ruled out absolutely, since strict sibling mating has been practised for only 8 generations. However, in view of the consistency of the survival responses of progenies from the two maternal diets this possibility appears remote.

Watson⁹ has recently reported resistance tests on mice maintained on 8 different diets. The young were subjected to the test diet either from the prenatal period onward or for only 3 weeks before being tested. At 12 weeks of age they were inoculated with mouse typhoid (100 million organisms by mouth) and were placed in individual cages. The hereditary factor was not controlled, the stock mice having been obtained from several different breeders. In spite of the differences in technic the results appear to be essentially in agreement with those given here. Three weeks on the test diet

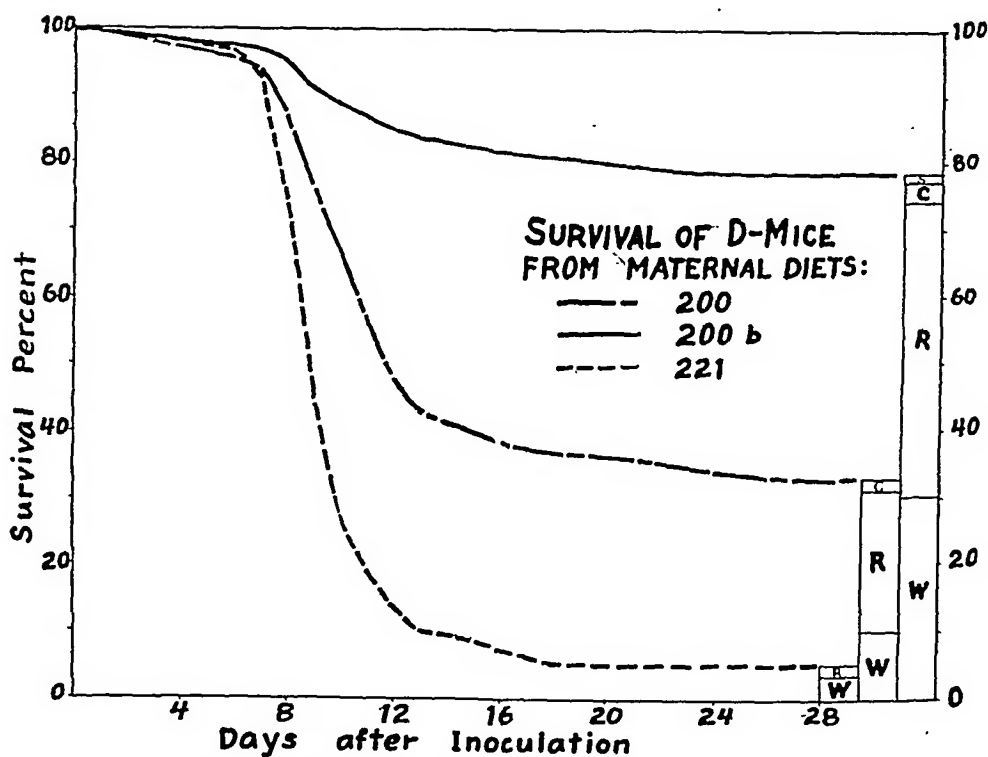


FIGURE VI—The influence of the maternal diet, continued for four generations, upon the resistance of the offspring

before inoculation had no apparent effect upon resistance, whereas exposure to the influence of certain diets from the prenatal period onward gave rise to significant changes in resistance.

SUMMARY

Nonspecific resistance to infection has been studied in 2,868 mice of three lines, inoculated with *Salmonella enteritidis*. When the external environment and the parasite factors including strain, virulence, dosage, and portal of entry, were kept uniform, the survival of mice at risk was dependent upon heredity and nutrition.

When the dietary background was kept uniform the three lines of mice gave mortality responses in agreement with those obtained by Webster. The time-survival data of each line gave a normal frequency distribution truncated at 9 to 12 days after inoculation. The point of truncation appears to

coincide with the antibody response of those that survive the first onslaught of infection.

By graphic analysis the mean survival time of the original population, independent of the effect of specific immunity, can be derived. It is suggested that the mean survival time obtained in this way is a measure of nonspecific resistance which can be applied to any homogeneous population tested with a suitable pathogen under controlled conditions.

The diet of the mother before and during gestation was a factor of major importance in influencing the resistance of the offspring to the risk of infection. The protection thus afforded lasted at least until maturity was reached, and progressive improvement took place for at least three generations on the same diet. The influence of diet upon resistance may thus be on a par with the influence of heredity.

Explanation of Charts: Each curve represents a group of mice (usually 20 or multiples of 20) of the same genetic and dietary background, inoculated by stomach tube with a standard dose of *Salmonella enteritidis* and kept under observation for 28 days. Survival *per cent* is plotted against time in days.

The clinical condition of the surviving group is shown by the vertical columns at the right: W = Well through entire period; R = Ruffed fur only; S = Sick; C = Convalescent.

The statistical analysis in Figures IV and V is indicated as follows: Diff. = Difference between survival percentages at 28 days; S.E.D. = Standard Error of the Difference =

$$100 \sqrt{PQ \left(\frac{1}{n} + \frac{1}{n'} \right)};$$

Odds against the observed difference being the result of chance.

NOTE: I acknowledge my gratitude to Dr. L. T. Webster, Dr. J. C. Gittings, Dr. Joseph Stokes, Jr., and the Rockefeller Foundation for the opportunity of conducting this study; My appreciation to Miss Claire Foster and Miss Dorothy W. Asher for assistance in carrying it on.

C. F. C.

REFERENCES

1. Webster, L. T. Experimental Epidemiology. *Medicine*, 11:321, 1932.
2. Church, C. F., Foster, Claire, and Asher, Dorothy W. Diet and Resistance to Infection. The Effect of the Maternal Diet. *A.J.P.H.*, 27:1232, 1937.
3. Webster, L. T. Development of Resistant and Susceptible Lines of Mice Through Selective Breeding. *J. Exper. Med.*, 57:793, 1933.
4. Webster, L. T. Inheritance of Resistance of Mice to Enteric Bacterial and Neurotropic Virus Infections. *J. Exper. Med.*, 65:261, 1937.
5. Bliss, C. I. *Ann. Applied Biol.*, 24:815, 1937.
6. Webster, L. T., and Pritchett, Ida W. The Effect of Diet on Host Resistance. *J. Exper. Med.*, 40:397, 1924.
7. Pritchett, Ida W. The Effect of Diet on Host Resistance (Further Studies). *J. Exper. Med.*, 46:557, 1927.
8. Topley, W. W. C., Greenwood, M., and Wilson, J. The Effect of Diet in Epidemic Infection in Mice. *J. Path. & Bact.*, 34:163, 1931.
9. Watson, Marion. The Effect of Various Diets on the Resistance of Mice to Bacterial Infection. *J. Hyg.*, 37:420, 1937.
10. Church, C. F. The Effect of Dietary Minerals on Host Resistance. *J. Bact.*, 34:350, 1937.
11. Church, C. F. Unpublished data.
12. Church, C. F., and Foster, Claire. Effect of Diet Upon Resistance to Infection. I. Maternal Diet. *Am. J. Dis. Child.*, 54:1178, 1937.
13. Asher, Dorothy W. Mineral Metabolism. *Am. J. M. Technol.*, 4, 1938.

A Hopeful View

PULMONARY tuberculosis is a chronic systemic disease with a decided tendency to heal. The chronicity, inherent tendency to heal, and curability are due to a beneficent auto-immunization. Were this not true the human race would long since have vanished. This chronicity, when the disease is untreated, inadequately treated, or

unrecognized, is responsible for its continuous contagion and universal distribution, for a reducible economic waste and disability, and for a certain irreducible mortality rate. . . . A Program for Early Aggressive Treatment of Pulmonary Tuberculosis, Casper F. Hegner, M.D., *J.A.M.A.*, Jan. 14, 1939, p. 136.

Production of Antipneumococcic Rabbit Serum*

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ANTIPNEUMOCOCCIC Rabbit Serum, Therapeutic, introduces the clinician to an entirely new product in the field of serum therapy. The results obtained from the use of immune rabbit serum in the treatment of pneumococcic pneumonias in the Hospital of the Rockefeller Institute for Medical Research, New York,¹ and Long Island College of Medicine,² indicate that the serum is an effective adjunct in the treatment of pneumococcic pneumonias. Recognition is given those from the Hospital of the Rockefeller Institute for the pioneer work that has been done with antipneumococcic rabbit serum. The report on the production, processing, and standardization of antipneumococcic rabbit serum,³ is informative and of great value to those interested in the many phases of this work.

This report is submitted with the hope that it may prove of some interest to those producing or who may anticipate the production of type specific antipneumococcic rabbit serum. It deals with the production of serum as carried out in a commercial laboratory. The methods were developed following the counsel and literature of those mentioned. The report further deals with

the rabbit mortality incident to the production of type specific sera from a colony of approximately 1,000 rabbits.

ESTABLISHING THE COLONY

It is no small undertaking to establish a sizeable colony of rabbits and maintain it in a state of health conducive to the economic production of immune sera.

After thorough consideration of the problems involved, reliable sources for rabbits were contacted with the hope of arranging a satisfactory plan for purchase. Those interviewed were willing to supply rabbits subject to approval. Conditions of sale specified that the rabbits be in an acceptable condition of health, weigh 4 lbs. or more, and be preferably of the New Zealand Red or Chinchilla breed. It was further specified that young rabbits were preferred and all stock must have a good ear with a visible marginal ear vein. They were purchased at a given price per lb. which was considered fair and acceptable for the purchaser and seller. The rabbits delivered to the laboratory were carefully examined, the history of their origin noted, in so far as disease was concerned, weighed, and segregated in a unit specially planned for the purpose. During the early period of partial isolation, and as soon as was practicable, all rabbits were injected subcutaneously with 5 c.c. of polyvalent

* Read before the Laboratory Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

whole culture antihemorrhagic septicemia bacterin. After isolation of 10 to 14 days, the rabbits were moved into the unit designed for the producing group. During isolation they were examined daily for symptoms of infectious or contagious disease. Fortunately the source of supply was good and most of the rabbits purchased had been raised on local farms or in comparatively small colonies. Rabbits were occasionally rejected and if one or more were rejected in a particular shipment, all exposed to those individuals were likewise rejected, particularly if an infectious disease was suspected.

In view of the fact that rabbits under immunization are handled as frequently as 4 and 5 days a week, they should be housed in suitably designed buildings, and in cages conducive to a saving of time and labor. The two houses being used are 125' long by 20' wide with 8', 10" ceilings. They are well lighted by windows which provide adequate ventilation without draughts. Cupolas provide additional ventilation. Buildings are insulated to eliminate excessively high temperatures during the summer and each building is equipped with an automatically controlled oil burner fuel system which has very satisfactorily maintained an even temperature during the fall, winter, and spring. The mortality among our rabbits due to excessive heat, draughts, and similar conditions frequently responsible for many deaths in a colony not satisfactorily provided for, has been negligible. A temperature of approximately 50° F. during those months when the atmospheric temperature was considerably lower, seems ideal. The colony during the winter months has shown some evidence of snuffles. This condition was easily controlled by the addition of cod liver oil to the diet. The colony has experienced no outbreak of any disease of an infectious character.

The buildings are so designed as to

provide for a row of cages on each side with a double row through the center. The cages in the center are 6 high and house 48 rabbits per section. The same number of sections are provided on each side of the buildings with the exception of beneath the windows where the cages are but 4 high. Rabbits are individually caged, the size of the cage being optional, though one 26" wide, 20 $\frac{1}{4}$ " deep and 14" high is adequate. Water is supplied each rabbit by means of an inverted glass bottle fitted with a rubber stopper through which is inserted a piece of brass tubing. The rabbit laps the water from the projecting tube. The containers are very serviceable and it has been of interest to note that most rabbits will consume 8 to 10 oz. of water a day throughout the year even when moist, green food is supplied as part of the diet.

The alleyways between cages are 4', 10" wide allowing ample space for the cleaners to move their carts. The individual cages have metal floors, are cleaned every other day, thoroughly washed and sprayed with a 4 per cent solution of cresol, then rebedded with clean, dry shavings. Sanitation has been maintained at all times and this factor is essential in the successful maintenance of a healthy rabbit colony.

Identification of Rabbits

Each rabbit is identified with an ear tattoo number before being assigned to the production of a specific serum. A letter or number prefix identifies the type of serum the rabbit is to produce. The rabbits are weighed and on a card attached to the cage is recorded the weight, tattoo number, and date of entry into the colony. Individual charts are kept for each rabbit, giving similar information together with a record of immunization, bleedings, and such other data as may be pertinent to the history of the animal during its life in the colony.

FEEDING

Producing rabbits, in addition to being well housed in clean, sanitary cages, should be fed a well balanced palatable diet. The rabbits purchased, coming from many sources, are undoubtedly fed a variety of diets. Animals do not do well when decided changes are made in their diets and for this reason we consulted those supplying rabbits to learn, if possible, the foods most generally fed. This resulted in such a great variation that it was necessary to arrange for a feeding schedule that was attractive to the majority of purchased rabbits. A commercially prepared food has proved entirely satisfactory. The rabbits relish this and during the production of serum have steadily gained weight, which seems to be a reliable indication of a good food. In addition to the commercially prepared food, alfalfa, carrots, cabbage, beets, etc., of a good quality are supplied as a supplement from time to time.

BACTERIAL SUSPENSIONS FOR IMMUNIZATION CULTURES

It has been proved that virulent cultures are essential for the preparation of bacterial suspensions that will be most effective in the production of a serum of high titer in animals.⁴ Type specific pneumococcus cultures are used in the smooth phase, where it is possible, and mouse virulent strains are used exclusively. The cultures being used at the laboratory are infective for mice, though some possess little or no virulence for rabbits. It is our opinion that cultures virulent for rabbits and mice are more desirable than those virulent for mice only. It has been observed that strains of pneumococcus possessing little or no virulence for mice are rarely virulent for rabbits. The cultures used for immunization should be passed each week or more frequently through either mice or rabbits, or both mice and rabbits for the maintenance of virulence.

Beef heart phosphate broth to which has been added 1 per cent defibrinated blood is used as a stock broth. Cultures for animal inoculation (virulence test) are seeded from this to the same broth to which dextrose has been added, grown for varying lengths of time, approximately 4 to 8 hrs., then diluted for animal passage. The range of dilution varies in respect to the virulence of the type specific pneumococcus. All cultures are identified for specificity as well as cultural characteristics before being inoculated into broth for antigen production. The virulent strains have retained their smooth phase and virulence for many months for mice and rabbits. All strains are not rabbit virulent.

Broth

Each lot of beef heart phosphate broth is tested for its suitability and natural muscle sugar content. It is important to establish the broth as a suitable medium and this is done by tubing 20 c.c. samples from each lot. A varying amount of dextrose (.02 per cent to .08 per cent by volume) is added to each of the tubes, and each tube is inoculated with the selected strain of the pneumococcus, grown 16 hrs. at 37.5° C. and pH determinations made from the broth at the end of the growth. The amount of dextrose finally added to the lot of broth is governed by the tube which shows the optimal pH. A pH between 6.6 and 6.8 is considered optimal (within the desirable range) and the dextrose broth tube giving that titration is selected as the tube containing the ideal amount of dextrose to be added to that particular lot of broth. This may be considered an unnecessary precaution but the procedure is simple and has resulted in the production of entirely satisfactory bacterial suspensions of Gram-positive staining organisms. Certain type specific pneumococci grow very rapidly and these should not be grown at 37.5° C. for the same number

of hours for the preparation of an ideal suspension for immunization.

The antigen for immunization is prepared from the first transplant recovered from the mouse, or rabbit, and is seeded in bulk containers of broth containing not more than 3 liters. The inoculation of a large volume of broth is not as satisfactory as small volumes in the production of good bacterial suspensions. After the pneumococcus is grown for the time assigned by previous determinations for each lot, the bulk container is removed from the incubator and preserved with 1 per cent formalin. The containers are kept at room temperature until the evening of the day they were preserved; then placed in the cold box until the following morning, when the organisms are collected and resuspended in a 0.1 per cent formalized salt solution. Early in the work no attempt was made to standardize the suspension. It was noted, however, by resuspending the organisms in a definite volume of formalized salt solution representing one-tenth of the original volume of broth that the resulting suspensions were of varying turbidity, though quite uniform in staining characteristics. For this reason it was advisable to standardize the suspensions by some simple and practical method. The suspensions are now standardized to the approximate turbidity of 10,000 million typhoid bacilli per c.c. Standardization of the suspension seems advisable so that a uniform suspension is used throughout the course of immunization, particularly if the doses for immunization eventually become constant. It is appreciated that the accuracy of standardization depends upon the Gram staining structure of the bacterial suspension. Therefore, if the bacterial suspensions have autolyzed standardization is of little or no value. It has further been shown³ that most pneumococcus suspensions possess little toxicity for rabbits and that they tol-

erate wide variations in the number of suspended bacteria without bad effect.

Channel of Immunization

The intravenous method of immunization is used exclusively and the marginal ear vein the portal of entry. Cole and Moore demonstrated conclusively that intravenous immunization was essential for the production of immune sera of high titer.⁴

IMMUNIZATION AND BLEEDING SCHEDULES

It is natural that consideration be given to the production of an immune serum of high titer and to the plan of immunization that is conducive to the maintenance of the animal in a satisfactory state of health and over the longest period of time. The schedule of immunization carried out by Goodner, Horsfall, and Dubos,³ known as The Four Week Complete System, has been followed in its entirety with the exception that the holding dose has been 0.2, 0.5, 1, and 1 c.c. rather than 0.2, 0.5, 1, and 2 c.c. It was found necessary to reduce the 2 c.c. dose as will be shown later in the charts on mortality, hoping to reduce the mortality following this dose. The bleeding schedule has been followed in accordance with the plan.

BLEEDING

Rabbits are bled from the heart by cardiac puncture. The precardial area is clipped and wiped with cotton saturated with alcohol. The rabbits are fastened to a bleeding board by means of straps to their four feet with the ventral surface exposed to the operator. A sterile cloth is placed over the rabbit and bleeding board with a window cut out over the area of the chest, thereby exposing the region to the operator. Cardiac puncture is made with an 18 gauge needle attached to a sterile 50 c.c. syringe, the syringe having previously

been rinsed with sterile double normal strength salt solution. Cardiac puncture is made from a point of insertion just left of the median line at the margin of the xyphoid cartilage. This line of entry to the heart is used in preference to that of entering between the 4th or 5th rib. It enables the operator to withdraw blood from the heart without passing through the lung. Cardiac puncture by this channel into the left ventricle is more direct and the mortality following bleeding has been noticeably reduced. Many operators may not prefer this method of bleeding. Several methods of withdrawing blood have been used, the first was by creating 8 to 10" of vacuum in a bottle to which was attached a syphon with a needle adapter. It was discarded, however, in preference of the syringe method, where the operator was able to determine the exact amount of blood being drawn from the heart. Fifty to 60 c.c. of blood are taken at each bleeding. The serum recovered has been approximately 60 per cent of the blood drawn. The blood is collected in tubes 500 mm. in length and 65 mm. in diameter. They conveniently hold approximately 800 c.c. of blood. The blood is permitted to clot at incubator temperature after which the serum is drawn off, centrifuged, if necessary, pre-

served with methiolate to a concentration of 1 to 10,000 and filtered through a Berkefeld N. candle. The serum from the remaining clot in each tube is pressed out by dropping weights that have been attached by means of a pin through a rubber stopper prior to sterilization. The blood is delivered to the tube through glass tubing that has a removable cotton and gauze closure. This enables one to handle the serum aseptically and has proved practical and entirely satisfactory.

The 1,000 rabbits considered in this report have been immunized for the production of Type I, II, V, VII, VIII and XIV antipneumococcic sera. The data reported are taken from this group as a whole, and cover 1 year only. It may be noted, however, that at the end of the time, a small percentage of the group remain.

From the original colony of 1,000 rabbits, 6,114 bleedings were made from June 30, 1937 to July 1, 1938. Of the 1,000 rabbits 421 died following bleeding. These deaths are directly attributable to bleeding and occurred within 24 hours following. Two hundred and two died during the course of immunization, and their death may be directly attributed to the injection of the bacterial suspensions. One hundred and forty-two died from other causes not asso-

CHART I—Distribution of 406 rabbit deaths due to bleeding

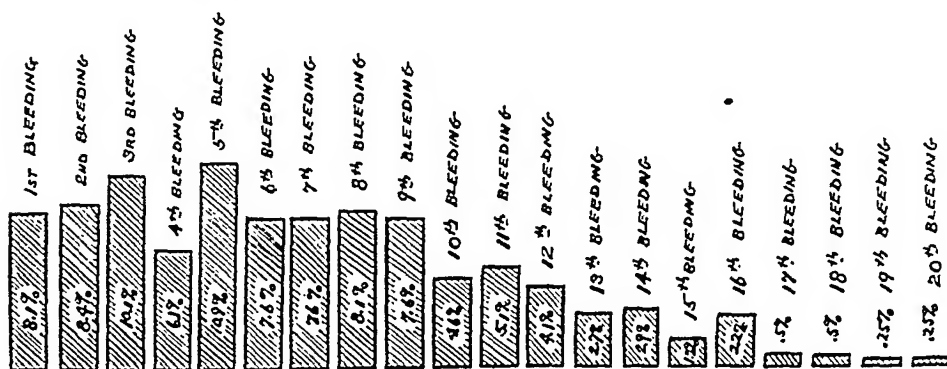
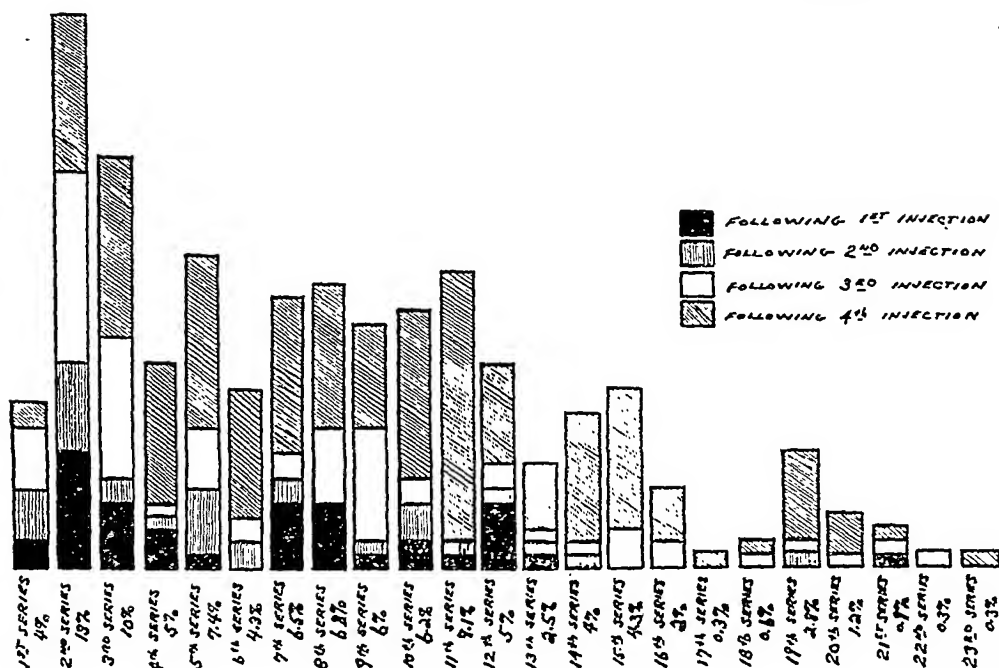


CHART II—Distribution of 324 rabbit deaths due to immunization



ciated with either bleeding or immunization. Injury has not been a factor in mortality rate.

It may be noted from the figures on mortality, considering the total number of deaths of rabbits from all causes that a rabbit in the colony has a life expectancy of approximately 9 bleedings.

During the year, 765 of the rabbits, or 76.5 per cent, died from all causes and 235, or 23.5 per cent, are in the colony and continue as producing rabbits.

For 1 year, exclusive of the rabbits remaining in the colony, 1 death occurred for each 14.5 bleedings. The 23.5 per cent of rabbits remaining in the colony however, may materially increase the number of bleedings per rabbit death.

The cost factor has not been discussed in connection with the production of type specific antipneumococcic rabbit serum. Simple calculations, however, will reveal the cost to be equal to, if not greater per c.c. than, antipneumococcic horse serum.

It may be noted from Chart I that

the high mortality rate occurs during the first 10 bleedings. The percentages have been calculated on the basis of the number of rabbits dead following each bleeding compared to the total number of bleeding deaths. Of the 406 rabbit deaths due to bleeding, 8.1 per cent occurred with the first bleeding, 8.4 per cent with the second, 10.1 per cent with the third, and so on as represented. It is believed that the weaker rabbits not able to tolerate bleeding are self eliminating early in the program. The chart offers little other than the natural resistance of a colony to scheduled bleedings.

Chart II shows the distribution of 324 rabbit deaths due to immunization. The 324 deaths have been illustrated by columns showing the series of immunizations during which they occurred. The columns are subdivided to illustrate after which injection deaths occurred.

Each column and each column portion has been diagrammed from actual calculated percentages.

The second and third series of immunizations claim the greatest mortality, hence rabbits highly sensitive to the antigen are evidently weeded from the colony.

Beginning with the start of bleedings and the fourth series of immunization (see Immunization) it is interesting to note that the gradual rise in percentages of deaths are regularly reduced after each four series of immunizations by the scheduled rest period.

The relative per cent of deaths which follows the first and fourth injection of antigen in nearly every series is of interest. Before reducing the amount of the fourth injection in each series the rise in mortality after the fourth injection was more accentuated.

DISCUSSION

The management of a rabbit colony plays an essential part in the economical and successful production of immune sera.

Those responsible for production should arrange for their supply of rabbits from reliable sources. Purchases should be restricted to rabbits of desired weights, and of healthy stock. The rabbits should be individually caged and comfortably maintained under sanitary conditions, free from draughts. Feed should be of good quality, and sufficient to maintain the body weight of the rabbit in production. Fresh water supplied daily is a safe practice.

A satisfactory bacterial suspension is the prerequisite to an immune serum of satisfactory potency. This is first accomplished by maintaining the virulence of the type specific pneumococci,

growing them in a suitable medium and for an optimum period of time to prevent autolysis.

Accurate records are equally essential and without them the scheme of production and results obtained are of no value.

Rabbits respond to careful handling. Bleeding technic is best developed through practice and each laboratory will develop its individual method, which is best suited to it with the hope of reducing the mortality from bleeding.

Immunization schedules may vary depending upon the plan of those responsible for production. Intense schedules of immunization are apparently responsible for a high mortality and may not produce sera as high in unitage as schedules less intense with longer intervals of rest. Chart I, however, indicates that the bleeding mortality is regularly higher following rest periods.

If less than 50 c.c. of blood is taken from the rabbit of 4 to 5 lbs., with no rest periods, the mortality following bleeding and immunization will be materially reduced. Further data may support this.

ACKNOWLEDGMENTS

The writer wishes to extend his appreciation to those who assisted in keeping records which made this report possible. John Hohenadel's efforts to obtain data in connection with this report are especially appreciated.

REFERENCES

1. Horsfall, F. L., Jr., Goodner, K., MacLeod, C. M., and Harris, A. H., 2nd. *J.A.M.A.*, 108:1483, 1937.
2. Loughlin, Elmer H., Bennett, Richard H., and Spitz, Samuel H. *J.A.M.A.*, 111:497, 1938.
3. Goodner, Kenneth, Horsfall, Frank L., Jr., and Dubos, Rene, Jr. *J. Immunol.*, 33:279, 1937.
4. Cole, Rufus, and Moore, Henry F. *J. Exper. Med.*, 26, 4:537, 1917.

Rural Field Experience for Public Health Nursing Students*

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PROFESSIONAL education has gone through three stages in its development. The earliest was the apprentice stage where any one wishing to become a physician or a lawyer attached himself to a successful practitioner of his chosen career and, through observation and practice under his preceptor's direction, acquired the necessary training. Later the pendulum swung to the opposite side and practically all of the professional education curriculum was planned as intramural instruction.

The present-day trend in modern education, whether in the field of medicine, dentistry, law, cultural education, or public health, is toward a combination of theoretical instruction with practice under expert supervision as the most satisfactory plan for the preparation of any professional worker.

The objection to the apprentice system of education centered around the fact that the learner was required to do much that had little or no educational value in order to pay his instructor for the education he was supposed to receive. Frequently he was required to do certain types of work over and over long after he had mastered the

technics. Others found that their training had been very one sided and that there were many fields in which they had had no training or experience.

Field experience, as a regular part of a university curriculum in public health nursing, is fraught with the same dangers as the old apprentice system. Students may be assigned to agencies where they are required to assist the organization by performing routine tasks over and over, day after day, and little or no effort is made to teach them the proper application of public health nursing principles. The agency may not be wholly to blame for this. The field agency may be required to take students without any remuneration, and a good field practice program costs money. Naturally the agency tries to get its remuneration from student work. Or, the agency may not be equipped to give a satisfactory educational experience, and in that case it should not have been selected by the university for that purpose.

It follows that the success of the student's field experience depends upon a number of factors:

Is the field agency organized on a sound administrative basis?

Is the program carried by the agency well balanced and typical of most health programs?

Are the members of the professional staff equipped to serve as instructors?

* Read at a meeting of the Committee on Professional Education at the Sixty-seventh Annual Meeting of the American Public Health Association, Kansas City, Mo., October 27, 1938.

Has the university, or some other department, arranged to reimburse the field agency for the expense of teaching students?

Are the students detailed to the agency for a sufficient time to make it possible for them to participate in all of the various phases of the health program?

Have arrangements been made to provide individual transportation for the students?

These, and many other questions, were asked of all of the universities and colleges in the United States which offer approved courses of study in public health nursing. Replies were received

from all but 2 of those to which the questionnaires were sent. Three universities replied that they were not at present offering rural experience to their public health nursing students. Two of the colleges sent information about the state health department of their respective states rather than on the local health agencies, and thus the information was not comparable. Fairly complete returns were received from 10 colleges and universities, and the comparable information received from the

TABLE I

*Rural Health Agencies Which Were Used for Field Experience by the Colleges and Universities Offering Approved Courses of Study in Public Health Nursing and the Number of Nursing Students Who Received Rural Experience During 1937-1938**

College or University	Number and Type of Agencies Used for Rural Field Experience			Total Number of Students Who Received Rural Experience During 1937-1938
	County Health Department	District Health Unit	County Nursing Service	
University of California	4	1	1	20
Catholic University	1	—	—	1
University of Michigan	1	†	—	13
Wayne University	1	1	—	6
University of Minnesota	—	3	6	41
Western Reserve Univ.	4	—	—	23
University of Oregon	3	—	—	76
Peabody College	2	1	—	77
Vanderbilt University	1	—	—	18
Medical College of Virginia ‡	—	1	—	1
College of William & Mary ‡	—	**	—	12
University of Washington	9	—	—	49
Total	26	7	7	440

* Universities of Ohio, Pennsylvania, and Syracuse offered no rural field experience to public health nursing students last year. No replies were received from Simmons College and Columbia University.

† Two agencies used jointly with Wayne University

‡ Complete information on rural field training not available

** One agency used jointly with Peabody College

other 2 colleges was included in the final tabulations.

AGENCIES USED FOR RURAL FIELD EXPERIENCE

According to the information collected in this study, 40 different rural health agencies were utilized in giving rural field experience to 440 public health nursing students last year. Three of the agencies were used by two universities. Both the University of Michigan and Wayne University sent students to the Michigan Community Health Project (the project financed by the Kellogg Foundation) and to the Children's Fund of Michigan. Peabody College and the College of William and Mary both sent students to the rural teaching center in West Virginia. Therefore, in the preparation of the tables which follow, these agencies were counted but once, even though they were used by more than one university.

From Table I it will be seen that 26 of the agencies used for rural field experience were organized as county health departments, 7 were district health units, and 7 were county nursing services only.

Table II gives a very sketchy picture of the personnel employed by these agencies. All but 7 were under the direction of whole-time health officers; 28 employed full-time local nursing directors or supervisors; of the 12 which did not have local nursing supervisors, 5 were one-nurse services, 4 had but 2 nurses, and 3 had only 3 nurses; 31 employed one or more sanitation officers. The 7 county nursing services and 2 of the county health departments had no sanitation personnel.

A total of 273 staff nurses were employed by these 40 agencies. The size of the staff varied considerably. Five agencies had but 1 nurse, while 10 had staffs of 10 or more nurses.

A public health council or advisory health committee made up of com-

munity leaders and representatives of voluntary health agencies is considered by many health administrators to be a valuable and necessary adjunct to sound local health organization. Twenty-four of the 40 rural agencies had a local advisory group of some type. However, some of the advisory boards or councils were made up entirely of county or township officials, and others represented only professional groups such as medicine and dentistry.

It is generally agreed that a good teaching agency should be one which is a "going concern" and has a well developed program. More than half of the 40 rural agencies had been in operation 10 years or more. However, 8 of them had been organized during the last 3 years and may not have had time to become stable organizations.

QUALIFICATIONS OF STAFF

While no attempt was made to secure information on the qualifications of any of the health department staff except the nurses, it is recognized that the health officer and other personnel must be well qualified public health workers if the nursing student's experience is to be satisfactory.

Of the 28 nursing directors or supervisors who were employed by these rural health departments, all of them were high school graduates, and 19, or about 68 per cent of them, had academic degrees. Twenty-three, or about 82 per cent, had certificates in public health nursing or had completed an equivalent amount of work in an approved public health nursing course of study; 11, or about 41 per cent, had had special preparation in supervision of public health nursing (Table III). Several had had special training in obstetrics, venereal disease control, or tuberculosis work.

Of the 273 staff nurses who were employed by these agencies, only 4, or less than 2 per cent, had not completed

TABLE II

*Personnel of the Rural Health Agencies Which Were Used for Public Health Nursing Experience During 1937-1938 by the Colleges and Universities Which Offered Approved Courses of Study in Public Health Nursing**

College or University	Total Agencies Used for Rural Experience	Number of Rural Health Agencies Having						
		A Whole-time Health Officer	A Nursing Supervisor or Chief Nurse	One or More Sanitation Officers	A Nursing Staff of			
					Only 1 Nurse	2 to 5 Nurses	5 to 10 Nurses	10 or More Nurses
University of California	6	5	4	4	—	2	1	3
Catholic University	1	1	1	1	—	—	1	—
University of Michigan	1†	1	1	1	—	1	—	—
Wayne University	2	2	1	1	1	—	1	—
University of Minnesota	9	3	4	3	4	1	1	3
Western Reserve	4	4	4	4	—	2	1	1
University of Oregon	3	3	3	3	—	—	3	—
Peabody College	3	3	3	3	—	1	1	1
Vanderbilt University	1	1	1	1	—	—	1	—
Med. College of Virginia	1‡	1	1	1	—	—	—	1
William & Mary ‡	**	—	—	—	—	—	—	—
University of Washington	9	9	5	9	—	7	1	1
Total	40	33	28	31	5	14	11	10

* Universities of Ohio, Pennsylvania and Syracuse offered no rural public health nursing experience last year. No replies from Columbia University and Simmons College.

† Two services used jointly with Wayne University

‡ Information on all rural training facilities not available

** One service used jointly with Peabody College

high school. One hundred and ten had academic degrees and 218, or about 80 per cent, had completed an accredited course of study in public health nursing. In addition, 10 of the staff nurses had had special courses in supervision, 20 had had additional work in tuberculosis control, 8 had had special courses in venereal disease work, 9 had had special pediatric work, 6 special prepa-

ration in orthopedics, and 2 special courses in obstetrics.

From a comparison of the qualifications of the nurses employed by these agencies with the data obtained from former studies of the qualifications of nurses in official agencies, it would appear that agencies having staffs with superior qualifications had been selected for rural public health teaching centers.

TABLE III

A Comparison of the Qualifications of Nurses Employed in 40 Rural Teaching Centers in 1938 With Those of Official Public Health Nurses Who Were Included in Two Previous Studies Made by the N.O.P.H.N.

<i>Education</i>	<i>Per cent of Nurses Having Each Qualification</i>		
	<i>N.O.P.H.N. Survey of Public Health Nursing 1931 (634 nurses)</i>	<i>N.O.P.H.N. Study of Personnel Practices in Official Agencies 1936 (917 nurses)</i>	<i>Nursing Personnel in 40 Rural Agencies Used for P.H.N. Field Experience 1938 (301 nurses)</i>
High School Graduate			
Directors	57.6	33.3	100.0
Supervisors	55.2	61.9	....
Staff nurses	51.7	87.7	98.5
College Degree			
Directors	21.2	61.0	67.9
Supervisors	5.7	37.1	....
Staff nurses	2.3	5.0	40.3
Public Health Nursing Certificate			
Directors	45.5	72.2	82.1
Supervisors	25.3	90.7	....
Staff nurses	8.0	19.0	80.0

PROGRAMS OF AGENCIES GIVING RURAL PUBLIC HEALTH NURSING EXPERIENCE

All agencies reported that their programs included the control of acute communicable diseases, and home visiting in the control of tuberculosis and venereal diseases. Twenty-eight, about 74 per cent, included diagnostic clinics for tuberculosis in their programs, and 21, or about 55 per cent, conducted venereal disease treatment clinics.

All of the agencies included maternal hygiene in their programs, but none offered a complete maternity nursing service including nursing assistance at delivery. Only one reported no pre-natal visiting. All reported postpartum visiting, but in the majority of cases it would appear that these visits were made in connection with the infant health supervision visits and that no actual postpartum nursing care was given. Fourteen stated definitely that no bedside nursing care was given even as a demonstration. All of the remaining agencies stated that nursing care

was given in emergencies and for demonstration purposes.

All carried an infant health supervision program but in 11 this service was confined to nursing visits to the homes, no group conferences or medical clinics being held. All included a school health service. All but 6 of the 40 reported that the nurses carried on some type of group teaching either in the high schools or with adult groups.

In general, it may be said that with the exception of nursing care to the sick, the rural agencies appear to carry a more completely generalized public health program than do many of the city agencies which have been used for student field experience. However, a really complete program in any of these services may not be possible when the population which each of the rural staff nurses is expected to serve is taken into consideration. The smallest population served by any one nurse in the group of agencies was 5,000, and in some there was but 1 nurse to 30,000 people. Obviously, regular maternity and bedside

nursing services would not be possible under those conditions, and it is probable that some of the other services were spread rather thinly.

RELATIONSHIP OF FIELD AGENCY TO THE UNIVERSITY

Eight of the universities and colleges offering rural field experience to public health nursing students appoint the supervising nurse of the field agency to the teaching staff of the university. Three of the universities employ full-time field instructors who work closely with the field agencies, coördinating the student's field experience. The educational supervisor of the state health department who has an appointment to the teaching staff of the university serves in this capacity in one state.

While all of the universities and colleges require the students to pay tuition for field experience, only 13 of the 40 field agencies received any remuneration from the university for the field teaching which they provided. The amounts received by the 13 agencies which were remunerated varied astonishingly. Several received a flat grant of \$600 a year without regard to the number of students; 1 received a grant of \$1,300 annually, and another 25 per cent of the salary of the nursing supervisor, 16 per cent of a staff nurse's salary, and 20 per cent of the salary of an office clerk. Several of the universities reimburse the field agencies by giving them a percentage of the tuition paid to the university. On a student basis, the fees received by the rural field agencies ranged from \$7.50 to \$85 a month! The median fee for each student per month was \$30. This was also the mode or the sum which was most frequently paid by the university to the field agency for field experience.

RATIO OF STUDENTS TO STAFF

It was encouraging to note that no

agency had more students assigned to it, at any given time, than the number of staff nurses. Nine agencies reported that, at certain times during the year, there were as many students on duty as there were staff nurses; but from the total number of students assigned for the year, it was apparent that the student load was not continuous. There were periods when there were no students assigned. The other agencies reported a ratio of less than one student per staff nurse.

LENGTH OF PERIOD FOR RURAL FIELD EXPERIENCE

The period for which students were assigned to rural agencies for field experience varied from 1 to 14 weeks. The majority of the agencies stated that students were assigned to them for 4 weeks. The University of Oregon stated that 4 weeks had been the usual time assigned to rural experience but that beginning this fall (1938), students would devote to it an entire quarter (11 weeks). The University of California has usually required an entire quarter's work with a rural agency. Western Reserve University has arranged for 1 week of observation for all students and a 6 weeks' experience with a rural agency for students who elect rural work.

TRANSPORTATION OF STUDENTS WHILE IN RURAL FIELD

"Field experience" implies actual participation in the field work. Field observation naturally precedes actual participation in the work; but unless the student is given an opportunity to carry certain responsibilities and serve as a member of the staff the experience is of less value. In rural areas it is essential that some provision be made for transportation if the student is to have an opportunity to function as a staff worker.

Of the 40 agencies on which informa-

tion was obtained, very few reported an adequate plan for providing transportation. Vanderbilt University owns several cars which are assigned to Rutherford County (which serves as the rural field for that school); these are used by the students, and by the staff of the health department during the student's observation period. Two of the universities pay for gasoline and oil for students who have their own cars. Two of the agencies in California furnish cars for student use. Students are assigned to these agencies for 14 weeks' experience, so are more capable of doing individual work than are those who stay but 1 month. A number of the agencies reported that the students owned and operated their own cars. Students who receive a stipend from Social Security funds are sometimes expected to use a part of their stipends for this purpose. The majority of the agencies reported no regular plan for transporting students, and stated that the student merely traveled with one of the regular staff.

SUMMARY AND CONCLUSIONS

The following principles are considered by many public health nursing educators to be desirable in establishing a rural field experience center:

1. The agency selected should be an organized county or district health department which has developed a well rounded health program. All personnel employed by the agency should meet the minimum qualifications for their various types of work.

2. There should be at least one whole-time nursing supervisor responsible for the student program who is eligible for faculty appointment in the college or university with which the agency is affiliated. If there are more than 6 or 7 staff nurses a second supervisor, to function in an educational capacity, should be provided.

3. A satisfactory relationship between the agency and the university should be worked out which would:

- a. Provide reasonable compensation to the health agency for the field teaching
- b. Give the health officer and supervising

nurse faculty appointments in the university as field instructors

- c. Establish a regular plan for conferences on student experience between the faculty of the university and the supervisory staff of the field agency

4. The number of nursing students assigned to the field agency at any one time should never exceed the number of staff nurses employed by the agency. It is preferable not to have a continuous student load. Periods when no students are assigned to the agency are highly desirable.

5. The student should be assigned to the agency for at least 6 weeks of continuous experience, and preferably longer.

6. The student's experience should include both observation and actual participation in all phases of the health program. This requires some specific provision for student transportation.

In checking over the present facilities for rural experience for public health nursing students, it appears that:

1. The majority of the agencies now used for this purpose meet the minimum requirements in so far as organization is concerned. All but 7 of the 40 agencies are organized health departments under the direction of whole-time health officers. However, 9 of the agencies had no sanitation personnel.

2. The programs carried by the various agencies are fairly general and cover the usual health department activities. However, there is need for an increase in the number of staff nurses employed by all of the agencies if each nurse is to have a reasonable case load. No nurse can carry on a satisfactory generalized public health nursing program if she is serving from 10,000 to 30,000 people. There is need for more emphasis on the giving of nursing care, particularly as a demonstration, if the service rendered is to be really effective.

3. Only 28 of the 40 agencies provided full-time local nursing supervisors. Naturally an agency cannot provide a supervisor for a staff of one or two nurses. There are certain advantages in having experience in the smaller and less complex agencies. If the local staff nurse is well qualified as a teacher, as was the case in one or two of the one-nurse counties, the situation may be satisfactory. However, the population per nurse was so great in most of the one or two nurse agencies that it is difficult to see when the staff nurse had time for supervising a student.

4. The qualifications of the nursing per-

sonnel were exceptionally high. Practically all of the staff met the minimum qualifications recommended by the Professional Education Committee of the American Public Health Association, and many of them exceeded those qualifications. The majority of the supervisors and a large percentage of the staff nurses would qualify for faculty appointment to a university although only 8 universities have adopted that practice.

5. The number of students assigned to the agency at one time appears to be satisfactory. No agency admitted more students at one time than it had staff nurses. In the majority of the agencies the ratio was less than one student to one staff nurse.

6. Only one university assigned students to the field agency for less than 1 month. One month was the most frequent assignment made last year, but 2 universities indicated that students would be assigned to the rural agencies for longer periods beginning this year.

7. Very few universities or agencies have worked out a satisfactory plan for the

transportation of students. If the student always accompanies a staff nurse, there is little opportunity for individual student practice. A satisfactory plan for student transportation is a universal need.

8. Twenty-seven of the 40 agencies which provided rural experience for public health nursing students last year did so without any remuneration from the university. A good teaching program is expensive. The university cannot expect teaching of good quality from volunteer instructors. In some of the states, the state health department gives additional aid to the agency used for field training. Since a well organized field teaching center may be used by the state health department for a variety of useful purposes, such a plan may be a partial solution of the problem. At any rate, it must be remembered that the health department's first obligation is to the community. Unless good service to the community is the first objective of the field agency, it is not likely to have a program that is worth while for student experience.

THE APRIL JOURNAL

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Place of the Methylene Blue and Resazurin Reduction Tests in a Milk Control Program*

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THE control of raw milk supplies rests largely upon frequent routine bacteriological examination. Opinions may differ concerning the relative value of the three official tests (plate count, direct microscopic count, and methylene blue reduction test), yet when used with a proper appreciation of their limitations, each can assist in bringing about a considerable improvement in quality.

For the ordinary run of milk for pasteurization the plate count is practically disqualified by reason of greater cost and delay in obtaining results. There is also evidence that it is a less reliable indicator of utensil contamination than is the Breed count or reduction test.²⁵ The Breed smear without question furnishes the most complete information, both qualitative and quantitative. It is at its best with the very poor milks, declining in accuracy as the count decreases.^{19, 28} As milk supplies improve,

therefore, a stage is reached where doubtful reliance can be placed upon the Breed count without greatly increasing the number of fields examined. This stage has already been reached in some cities. The need for a technically trained worker and expensive equipment, as well as the fatigue involved, are also factors tending to limit the use of this method. The reduction tests, on the other hand, do not involve expensive equipment, fatigue, or technical workers. They are well suited to the examination of large numbers of samples, and since the poorest milks reduce first, a check-up at the farm may be made without delay.

While extensively employed in the dairy industry, the methylene blue reduction test has received more limited acceptance by milk sanitarians on this continent. Doubtless this is due largely to the feeling that the reduction test, since it does not always correlate exactly with the bacterial count, is not sufficiently reliable for official control. In view of the fact that there is no method available for determining with perfect accuracy the actual number of bacteria present, and of the evidence accumulating concerning the

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degree of error inherent in the counting methods commonly employed,^{10, 11, 15, 21, 22, 30, 31} this attitude becomes increasingly difficult to justify.

While the dairy industry is interested in the methylene blue reduction test chiefly as an indicator of keeping quality, it is recognized that in official milk control current interest centers upon the established general relationship between reduction time and initial bacterial content.^{16, 23} Although discrepancies between reduction times and counts are not infrequently due to errors in the counting methods employed, it should be recognized that there are various factors which tend to disturb this relationship.⁷ Many of these are uncontrollable and their importance in practice has yet to be established. There are good reasons for believing that the most important factor, and one which is controllable, is the sweeping of varying proportions of the bacteria to the surface with the rising fat globules. The extent of the error thus introduced increases as the reduction time is prolonged, and has resulted in the feeling that the test is not reasonably accurate beyond the 5½ hour period.^{23, 24} Where steps are taken to redisperse the fat globules and accompanying bacteria at intervals during incubation, reduction time is generally shortened, significant variations between replicate tubes disappear, and decolorization is uniform throughout the tube.^{3, 6, 7, 23, 27, 30} On the recommendation of Wilson,³⁰ a modified test, the chief feature of which is the inversion of the tubes every 30 minutes, has been adopted in England for the official analysis of graded raw milks.¹² Frayer³ and Johns⁷ have published data favoring the modified test, but Thornton^{26, 27} opposes its adoption on this continent on the grounds that the accuracy of the test is not significantly increased thereby, while the technic is complicated unduly. Although for-

merly contending that mixing at intervals will lead to more accurate results with good milks,^{23, 24, 25} Thornton²⁶ now states that "neither test greatly excels the other in accuracy, despite the greater variability displayed in the standard test which may lead to inaccuracy in evaluating an individual milk." This opinion is mainly based upon the high coefficient of correlation (0.94 ± 0.004) he reports for the two tests.

Although admitting that "the variability displayed by the standard test may lead to inaccuracy in the case of an individual sample," Thornton appears to overlook the fact that it is not the *average* for a *series* of samples, but the reliability of the values obtained for each *individual* sample, with which we are concerned. He also appears to overlook a point of fundamental importance in any discussion of the relative accuracies of the two tests. Whether regarded as an index of initial bacterial content or of keeping quality, the test will obviously be most accurate where it reflects the oxygen consuming activity of *all* of the bacteria growing in the milk. This can only be done where the bacteria remain uniformly dispersed throughout the milk, and we may regard this as the *true* reduction time. Under the standard technic, however, we actually measure the time required by the highly variable fraction of the total bacteria not swept to the surface⁹ to reduce the dye in the body of the milk. Any practicable modification of technic whereby a more uniform dispersion is maintained should yield results more nearly approaching the *true* reduction time and may consequently be regarded as more accurate than the standard test.

While the results with different samples are not strictly comparable because of variations in the interval between the last inversion and the preparation of the smears, the data in

TABLE I

Influence of Hourly Inversion of Tubes Upon Number of Bacteria in Body of Milk

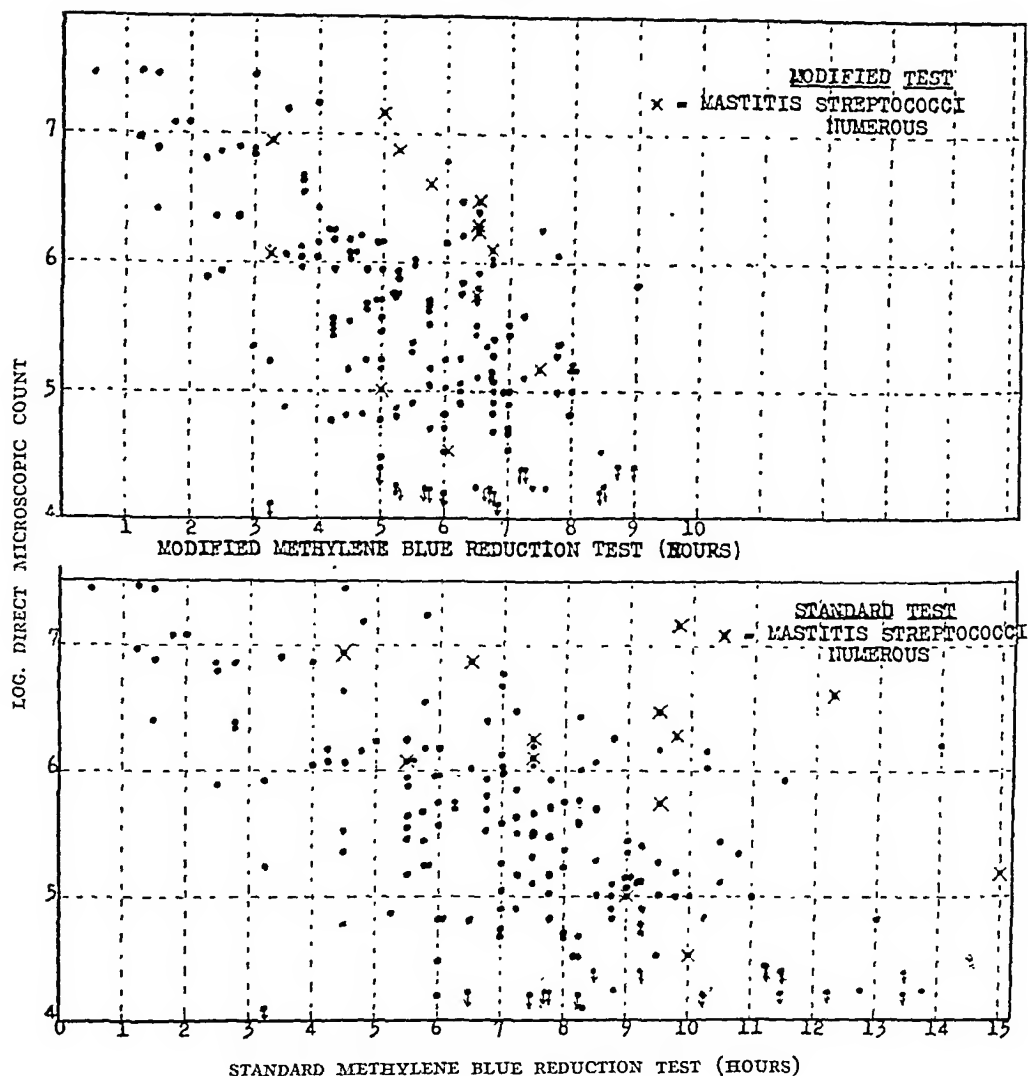
Sample No.	Methylene Blue Reduction Time (hrs.) ¹		Ratio Standard Modified	Interval Between Last Mixing and Making Smear (Minutes)	Direct Microscopic Count in Millions per ml. ²				
	Standard	Modified			A	B	C	D	E
57	11½	4	2.75	90*	1.31*	28.4*	0.51*	37.3*	170
39	13	6¾	1.93	45	75.1	79.6	1.48	46.0	259†
2	13¾	7¼	1.83	75	38.1	71.0	2.95	60.0	139†
48	11¼	6¾	1.68	45	95.9	103.5	2.13	42.8	271
49	10¾	6¾	1.56	45	47.6	43.0	3.25	33.3	144
51	8½	5¾	1.45	45	46.1	46.0	12.8	36.5	166
12	5¾	4	1.44	60	6.47	23.0	1.27	30.4	67.4
42	8¾	6½	1.34	30	16.8	27.7	4.5	56.8	136
62	3¾	3	1.25	60	42.2	56.5	28.5	44.0	74.9
8	4¾	4	1.18	60	52.5	33.2	5.0	38.9	42.2
Average—top 3 samples					38.4	59.7	1.65	47.8	189
bottom 3 samples					37.2	39.1	12.7	46.6	85.3
all samples					42.78	51.19	5.74	42.6	146.95

A=Modified test at time of reduction; body of milk before shaking
 B=Modified test at time of reduction; after shaking vigorously
 C=Standard test at same moment as A and B; body of milk before shaking
 D=Standard test at same moment as A and B; after shaking vigorously
 E=Standard test at moment of reduction; after shaking vigorously
¹ Average of triplicate tubes. Modified test—tubes inverted hourly
² 60 fields counted (individual cells)
 * Smear prepared at 4½ hrs.
 † Smear prepared at 11½ hrs.

Table I indicate that hourly mixing does bring about more uniform distribution of bacteria. It will also be observed that significantly larger numbers of bacteria are required to bring about reduction in the standard test (E), while there is less uniformity in such counts than in those at the moment of reduction in the modified test. Lastly, attention should be drawn to the wide differences in the ratios of standard to modified reduction times. Such differences have been found to be characteristic of milks from certain herds,⁷ and are related to differences in the intensity of creaming. While the limitations of the direct microscopic method are responsible for some discrepancies, the differences are sufficiently great to warrant the conclusion that the modified test reflects the initial bacterial content much more

accurately than does the standard test. Another way of comparing the accuracies of the two tests as a measure of bacterial numbers is to observe the correlation between the initial direct microscopic count and the reduction time. Data from 171 samples presented in Figure I indicate definitely less scatter with the modified method, particularly in the case of samples showing large numbers of mastitis streptococci. In view of the current interest in mastitis, this feature is deserving of consideration. In those areas where control work is confined to the detection of the poorest milks there will be little interest in the modified test. Where higher standards are set, the improved accuracy and shortened reduction time of the modified test should commend it. Since there is satisfactory agreement

FIGURE I



between inversion at $\frac{1}{2}$, 1, and 2 hrs.,⁸ a 2 hour inversion program would permit classification into 4 grades by observing the tubes after 2, 4, and 6 hrs.* This would avoid Thornton's objection that inversion of the tubes complicates the technic unduly.

Mention has been made of certain shortcomings of the methylene blue reduction test. To complete the picture, let us consider some of its specific advantages. Since a much larger portion

of milk is examined,[†] it avoids the serious errors frequently met with in the counting methods as a result of the uneven distribution of the organisms in the milk.^{9, 19, 30} Again, the clumping of organisms has little or no influence upon reduction time, while the plate count, and to a lesser extent the direct microscopic count, are seriously affected.^{15, 19, 28, 30} Finally, the reduction test is sensitive to the state of

* These grade limits correspond to average standard reduction times of 2, 5, and $8\frac{1}{2}$ hrs.⁸

[†] 50,000 to over 200,000 times as great as in the direct microscopic method and 1,000 to 100,000 times as great as in the plate count.

activity of the organisms,^{19, 30} which the counting methods fail to reflect.

With rare exceptions, milk sanitarians have thought of bacteriological quality exclusively in terms of numbers. Admittedly there is a definite relation between care in production and handling and the bacterial content. There is also a definite but less well recognized relation between cooling practices and the state of activity of the organisms. It has been shown^{19, 30} that the reduction test is sensitive to metabolic activity during the lag phase of growth, while the plate count is not. Few would contend that a sample was of equal quality at the beginning and end of the lag phase even though the count remained the same. Since faulty cooling practices are the chief cause of high count milks it seems only reasonable to regard the sensitivity of the reduction test to the state of activity of

the organisms as an advantage not possessed by counting methods. After all, the consumer is primarily interested in keeping quality, which is a reflection of both numbers and activity of the organisms. The employment of the reduction test in official control would therefore tend to place more emphasis upon the state of activity of the organisms, a feature which many believe has not received adequate recognition.

THE RESAZURIN TEST

There is considerable current interest in the resazurin test.^{1,2,4,5,13,14,17,18,19,20,29} The chief advantages claimed are: (a) it will furnish as much information after 1 hr. of incubation as will the older test after 5 to 7 hrs., and (b) it will more readily detect physiologically or pathologically abnormal milks.

While cognizant of its limitations, especially with low-count milk,^{19, 21} we

FIGURE II

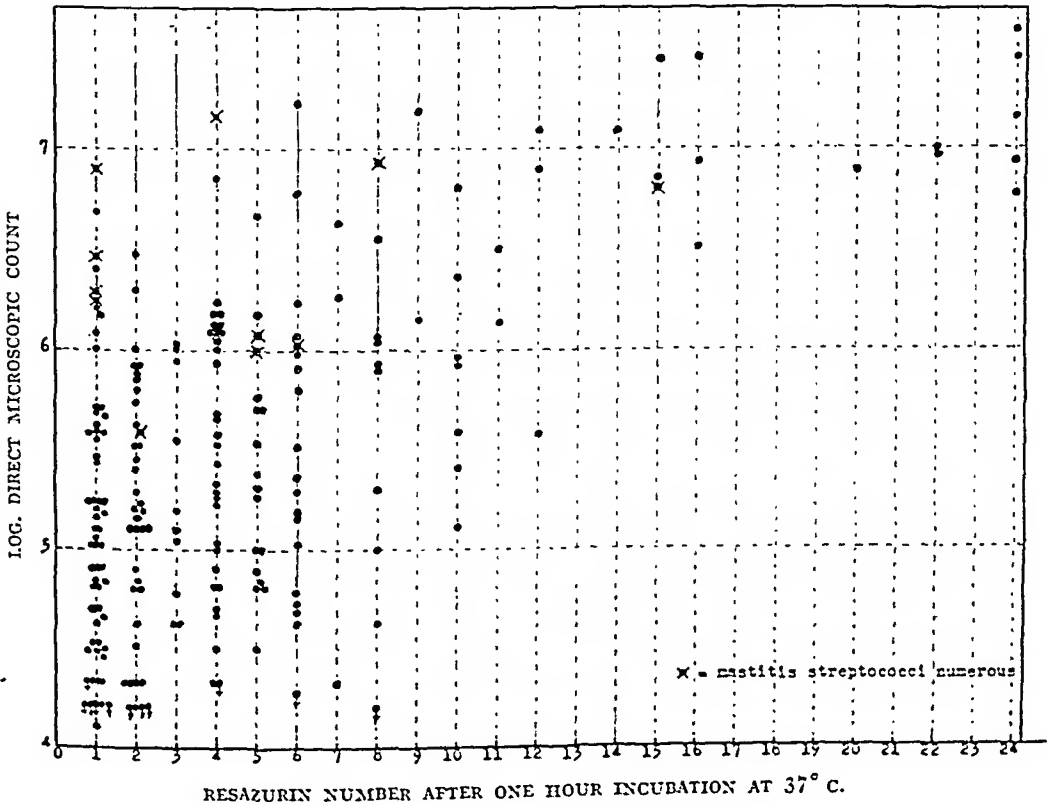
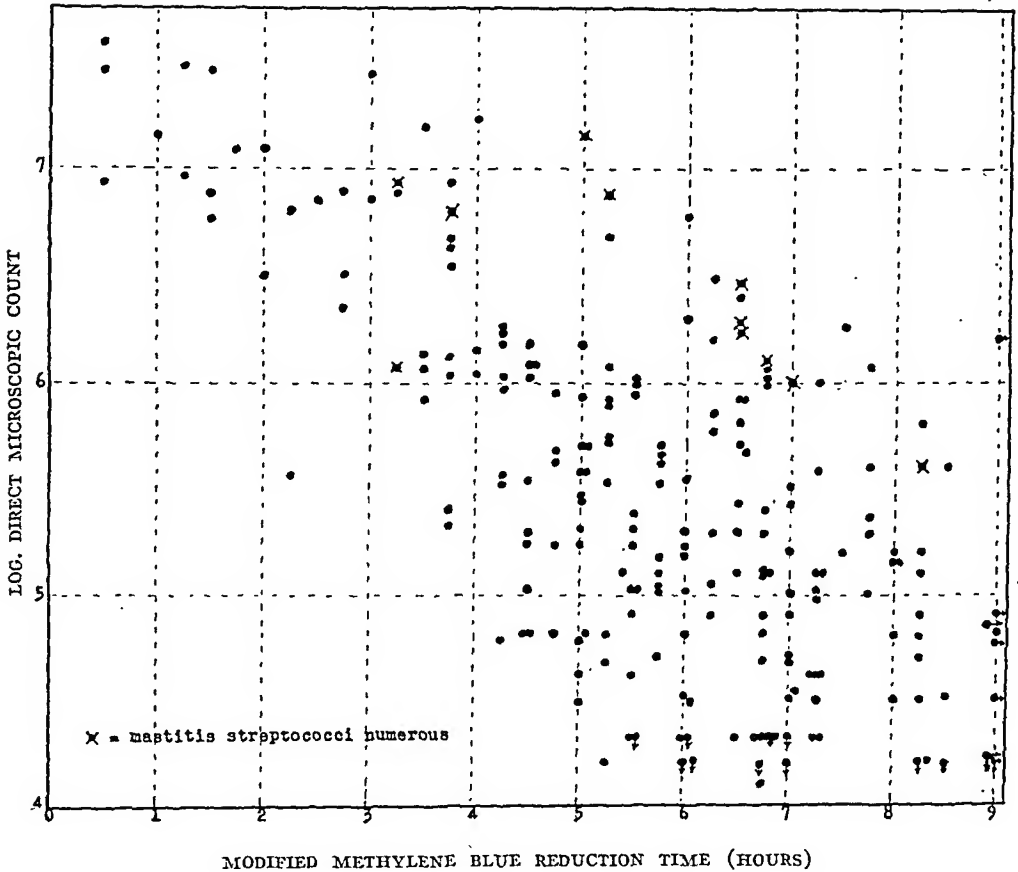


FIGURE III



have chosen the Breed count as the basis for assessing the value of the resazurin test as an index of bacterial numbers. An attempt has been made to increase the accuracy by counting 80 fields. In both resazurin and methylene blue reduction tests the creaming error was minimized by inverting the tubes every two hours, until incipient reduction was noted.

It was expected that the reported sensitivity of resazurin to milks with high cell counts^{1, 17} would seriously disturb the correlation between resazurin number and count, but in our studies (Figure II) this appears to have exerted little influence. Instead, the correlation is poorest with milks showing the least change in resazurin color. Comparable data from the

modified methylene blue reduction test are presented in Figure III. While there is a considerable degree of scatter, it appears that the latter test indicates the initial bacterial content more reliably.

The available evidence suggests that, with certain samples, resazurin will react to high cell counts more readily than will methylene blue.* It will not, however, invariably detect such milks, as Ramsdell's data, as well as our own (Table II) clearly indicate. On the other hand, a larger proportion of milks with high bacteria counts will

* Since abnormally high cell counts are not infrequently encountered in milk from cows showing no definite evidence of mastitis, it may be open to question whether the condemnation of such milks by the resazurin test is justifiable.

TABLE II

*Sensitivity of Resazurin and Methylene Blue Reduction Tests to Market Milks
With High Cell Counts*

Sample No.	Direct Microscopic Count ¹ per ml.		Resazurin ² Color Number at 1 Hr.	Methylene Blue ³ Reduction Time (hrs.)
	Cells	Bacteria		
E4	2,290,000	1,700,000*	1	6½
C37	2,130,000	143,000	6	5¾
E20	2,060,000	8,500,000*	8	3¾
C39	1,650,000	255,000	10	6¾
E5	1,590,000	113,000	1	6¼
A11	1,510,000	42,000	8	7¾
E11	1,460,000	1,030,000	1	6¾
D12	1,360,000	48,000	6	7
C5	1,310,000	32,000	6	5
B6	1,250,000	42,000	1	7¼
E29	1,200,000	48,000	4	5¾
E9	1,180,000	32,000	1	6
A26	1,140,000	21,000	4	7
A27	1,020,000	21,000	2	5½
A19	1,020,000	21,000	6	6¾
A14	995,000	105,000	4	7¼
C49	910,000	96,000	5	7¾
A9	863,000	21,000	7	6¾
B12	863,000	21,000	1	6
A24	765,000	42,000	3	7¼

¹ 60 fields counted

² Numbers represent shades between initial color (0) and full pink (16)

³ Tubes inverted at 2 hr. intervals until incipient reduction noted

* Long chain streptococci preponderant

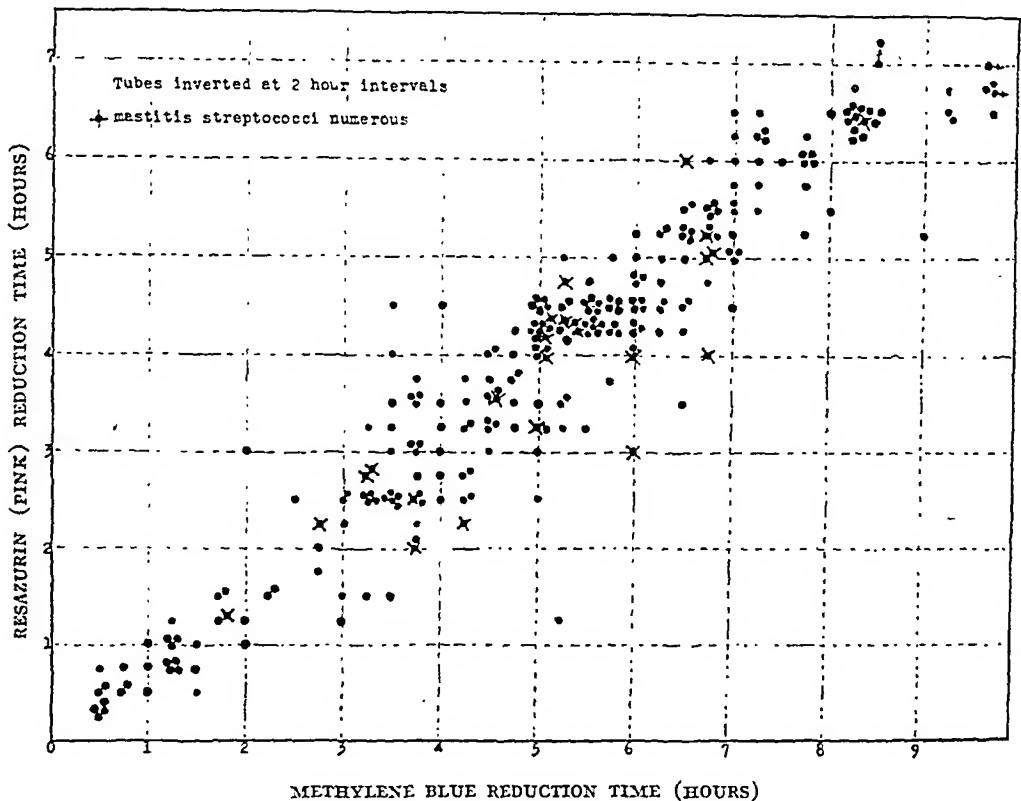
escape detection by the resazurin test. Microscopic examination of milks showing marked change in 1 hr., as recommended by certain workers^{1, 4} increases the diagnostic value of the test as regards mastitis, etc., but fails to compensate for the weakness just referred to.

In our studies of resazurin, observations were continued to the point of complete decolorization. Further analysis of the data disclosed a surprisingly close correlation between the time required to reduce resazurin to the pink stage and the methylene blue reduction time (Figure IV). Using this pink stage as the end-point, the incubation period is about three-quarters of that required to reduce methylene blue. When employed in this manner, rather than as a 1 hr. test, the resazurin test

appears to furnish a satisfactory index of bacteriological quality.

Whether or not resazurin will replace methylene blue remains to be seen. In spite of such shortcomings as sensitivity to light,^{4, 13, 17, 20} difficulty of obtaining satisfactory color standards,^{1, 13} difficulty experienced by some operators in distinguishing shades of color,¹ and lack of sensitivity to dormant organisms in well cooled milk,^{9, 17} several directors of plant laboratories^{1, 13} feel that the 1 hr. test may replace the methylene blue test for the grading of milk. Our own findings incline us to agree with Frayer⁴ and Ritter¹⁸ that the 1 hr. test is not sufficiently reliable for this purpose. When, however, incubation is continued to the pink stage, resazurin appears to be equally as reliable as methylene blue, while possessing an

FIGURE IV—RELATION BETWEEN METHYLENE BLUE REDUCTION TIME AND TIME REQUIRED TO REDUCE RESAZURIN TO THE PINK STAGE (261 MARKET MILKS)



important advantage in the shortening of the reduction period.*

Considerable further research must be undertaken before our knowledge of the chemistry of resazurin and its reactions in milk will be comparable to that concerning methylene blue. Until that stage is reached it seems best to defer final judgment concerning the place of the resazurin test in the field of milk control.

SUMMARY AND CONCLUSIONS

For routine testing of incoming supplies, the methylene blue reduction test has many advantages over the usual counting methods.

The accuracy of the test as an index of the initial bacterial content of the

better grades of milk is greatly improved where the organisms are redispersed by periodical inversion. Inversion of tubes every 2 hrs. yields results in good agreement with those from more frequent mixing.

The resazurin 1 hr. test does not indicate the bacterial content as reliably as does the modified methylene blue reduction test. The former places a larger proportion of high count milks in the highest grade. When incubation is continued to the pink stage, the accuracy of the test compares very favorably with that of the methylene blue test, while the reduction time is shortened.

The correlation between resazurin color and cell count is much poorer with market milks than with individual quarter samples. Many market milks with high cell counts fail to bring about a significant color change.

* When inverted every 2 hrs. to redistribute the bacteria, milks reducing methylene blue in 8 hrs. by the standard technic will on the average reduce resazurin to the pink in around 4 hrs.

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REFERENCES

1. Barrett, W. D., Rutan, H., and Keenan, J. A. The Resazurin Test—Its Use and Practicability as Applied to the Quality of Raw Milk. *J. Dairy Sci.*, 20:705-709, 1937.
2. Demeter, K. J., und Forg, J. Betrachtungen über die Reduktaseprobe und die Brauchbarkeit von Methylenblau und Azurufin. *Deutsch. Molk. Zeit.*, 55:1383-1384, 1934.
3. Frayer, J. M. Dyes and Methods as They Affect the Methylene Blue Reduction Test. *Vermont Agri. Exper. Sta. Bull.*, 424, 1937.
4. ——— The Resazurin Test—A Preliminary Study. *Vermont Agri. Exper. Sta. Bull.*, 435, 1938.
5. Jenkins, H. A Study of the Resazurin Test as Applied to Cream. *J. Dairy Sci.*, 21:141-142, 1938.
6. Johns, C. K. A Modification of the Methylene Blue Reduction Test and Its Comparative Value in Estimating Keeping Quality of Milk. *Sci. Agri.*, 11: 171-190, 1930.
7. ——— Concerning the Accuracy of the Methylene Blue Reduction Test. *J. Dairy Sci.*, 21:227-237, 1938.
8. ——— Factors Influencing the Reduction of Methylene Blue in Milk. *Sci. Agr.* (in press).
9. ——— Unpublished findings.
10. Malcolm, J. F. The Plate Method of Estimating the Bacterial Content of Milk. The Limitations of Procedure in Common Use, with Suggested Improvements. *J. Dairy Res.*, 4:91-104, 1932.
11. Mattick, A. T. R., et al. The Plate Count of Milk. *J. Dairy Res.*, 6:130-147, 1935.
12. Ministry of Health (England) *Memo. 139—Foods*, 1937.
13. Moldavan, A. The new "One Hour" Test for Quality Milk. *Canad. Dairy & Ice Cream J.*, 15:21-22, 1936.
14. ——— The Resazurin Test. *Vermont Dairy Operators' and Managers' Assoc.*, 16:50-52, 1937.
15. Orla-Jensen, S., und Faulenberg, G. Über das Problem der Keimzählung. *Zentralbl. f. Bakt.*, II, Abt., 97:387-389, 1938.
16. Rahn, O. Die Grenzen der Reduktaseprobe für die Milcharbeiten. *Milchwirtsch. Zentr.*, 49:287-315, 1920.
17. Ramsdell, G. A., et al. Investigations of Resazurin as an Indicator of the Sanitary Condition of Milk. *J. Dairy Sci.*, 18:705-717, 1935.
18. Ritter, P. Beiträge zur Methodik der Haltbarkeitsprüfung. *Milchwirtsch. Zentr.*, 66:334-8, 1937.
19. Robertson, A. H., and Frayer, J. M. Variability, Accuracy and Adaptability of Some Common Methods of Keeping Quality. *Vermont Agri. Exper. Sta. Bull.*, 314-318, 1930.
20. Schwarz und Seeleman, M. Reduktaseprobe mit Azurufin zur Beurteilung der Frischmilch. *Deutsch. Molk. Zeit.*, 57:1417-19, 1936.
21. Strynadka, N. J., and Thornton, H. R. The Accuracy of the Direct Microscopic (Breed) Count of Bacteria and Leucocytes in Milk. *J. Dairy Sci.*, 20:685-92, 1937.
22. Tiedeman, W. D. An Extensive Test of Variations in Bacteria Counts on Identical Milk Samples. *Proc. 22nd Ann. Conv. Internat. Assoc. Dairy & Milk Insp.*, 225-236, 1933.
23. Thornton, H. R., and Hastings, E. G. Studies on Oxidation-reduction in Milk. The Methylene Blue Reduction Test. *J. Dairy Sci.*, 13:221-245, 1930.
24. Thornton, H. R. The Use of the Methylene Blue Reduction Test. *Canad. Pub. Health J.*, 24:192-196, 1933.
25. Thornton, H. R., et al. Milk Contamination and the Methylene Blue Reduction Test. *Canad. Pub. Health J.*, 25:284-294, 1934.
26. Thornton, H. R. Modified Methylene Blue Reduction Technic. *A.J.P.H.*, 27:791-792, 1937.
27. Thornton, H. R. A Comparison of the Standard with the Modified Methylene Blue Reduction Technic. *J. Dairy Sci.*, 20:693-703, 1937.
28. Thornton, H. R. The Changing Methods for the Quantitative Estimation of Bacteria in Milk. *Canad. Pub. Health J.*, 29:270-276, 1938.
29. Warner, J. N. The Use of Resazurin in Determining the Bacterial Quality of Milk and Cream. *Dairy World*, 16:18-22, 54-56, 1938.
30. Wilson, G. S. The Bacteriological Grading of Milk. Medical Research Council (London) *Special Report Series, No. 206*, 1935.
31. Wright, William H., and Thornton, H. R. How Accurate Is the Quantitative Plate Count? *J. Bact.*, 13:63, 1927.

Experience of the Victorian Order of Nurses for Canada

With Cases of Pregnancy as Reflected by Case Records

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FOR some years there has been considerable concern among both official and voluntary health agencies in the matter of the higher-than-should-be maternal death rate in the Dominion of Canada. This concern has been manifested in a variety of ways. The lay organizations have on occasion become restless under what they describe as the failure of those officially placed to evolve a satisfactory solution of this problem; with the result that they have attempted to draw their own conclusions from the limited amount of factual information which has been available in this country.

Invidious comparisons have been made as between Canada and those countries in which midwifery practice is the vogue and there is a pronounced inclination to place undue emphasis on the presumed significance of certain

factors thought to be contributory to the high death rate.

The medical profession has been charged with an inadequate interest in the problem and it has been implied that such factors as unwarranted surgical interference, lack of adequate medical care, and the failure on the part of the profession to extend the maximum in the way of prenatal supervision have played a substantial part in bringing about this unjustifiable state of affairs. The necessity for the early establishment and continued maintenance of prenatal supervision has been emphasized to the extent that it is apparently regarded by many as a panacea for all the ills of the pregnant state.

The fact remains that the maternal death rate in Canada has been in the main unaffected by such efforts as have heretofore been directed at its lowering, and public concern in respect to this matter would appear to be justified.

Some 6 years ago, the Provincial Department of Health for the Province of Ontario sought the coöperation of the

* A preliminary report, read at a Joint Session of the Child Hygiene and Public Health Nursing Sections of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

medical men of the province in an attempt to secure certain desired data in all cases in which death was associated with pregnancy. The supplying of this information was made obligatory by statute one year later. After a careful review of the data secured, it was felt that much might be gained by an attempt to secure specific information as to what happens to the 995 women out of every 1,000 who, following pregnancy, do not die. Actually, it was felt that little in the way of progress could be made until we were better informed as to conditions associated with what might be described as "normal" pregnancies.

The members of the Sub-Committee on Maternal Mortality of the Dominion Council of Health, appreciative of the difficulties of securing accurate information of this type, turned to the Victorian Order of Nurses for Canada, suggesting that an intimate statistical review of their records might be helpful. This organization, which is national in its scope, operates a highly desirable type of bedside nursing care in a large number of urban centers throughout Canada. Some 48 municipalities in the Province of Ontario alone are served by the Order and much of the service rendered is to those in need of nursing care during pregnancy. The average number of maternity cases annually attended by the Order during the last 5 years was roundly 12,000.

The committee was probably influenced in its decision to secure the help of the Order by the fact that for many years not only has the maternal mortality rate among those cases attended by the Order been approximately half that of the rate for the country as a whole, but also the neonatal rate has been uniformly lower than the official rate for the Dominion. The fact that these patients are largely cared for by physicians without any special qualifications in the field of obstetrical

practice; that with relatively few exceptions they are delivered at home; and that many of them come from an economic level below the average; has continuously intrigued the interests of those officially concerned with this phase of organized public health.

The Order when approached was appreciative of the opportunity to make a contribution to the possible solution of this problem and willingly agreed to undertake much of the expense associated with the study. The study includes approximately 10,000 case records, comprising all cases attended by the Order during the years 1935 and 1936 in the Cities of Ottawa and Toronto as well as in East York and York Township. All cases were included regardless of the number of visits or whether the period of viability was attained or not. At this date, the information regarding 5,049 cases has been tabulated.

While it is planned ultimately to make available a complete detailed analysis of the results of the entire study, it has not been thought wise on this occasion to do more than report briefly our findings to date, under appropriate headings.

ECONOMIC STATUS OF THOSE SERVED

It was found that the majority of those receiving nursing care from the Order were, as previously implied, in the lower wage earning bracket. As the family income was not noted on the report form, this deduction was drawn from the fact that the monthly rental for living quarters was in 22 per cent between \$10 and \$15; and in 20 per cent between \$16 and \$24. Only about 1 per cent were reported as paying over \$40 per month for housing accommodation.

This inference was further supported by the fact that the nurse, using a rather elastic measuring rod, reported the economic status as:

	<i>Per cent</i>
Comfortable	16
Supplied with the necessities of life..	41
In a state of poverty.....	15
No reliable data reported.....	28

The home supplied less than one room per person in 35 per cent of the cases and 1 to 1.5 rooms per person in 30 per cent. The home conditions, a term with many implications, were noted by the nurse as being good in 53 per cent, fair in 23 per cent, and poor in 5.5 per cent.

SIZE OF FAMILY

In 16 per cent the cases were primipara; in 18 per cent there was one previously born child, while in 18 per cent the family consisted of 5 members.

SOURCE OF CONTACT

It is the fixed practice of the Order to serve only those who have already contacted their physician, although it is not required that the original contact with the Order shall be through the physician. In fact, only in some 19 per cent of the cases did the request for service come from the physician in attendance. In the bulk of the balance, namely, 52 per cent, the patient herself or her family sought the service. Only in some 5 per cent of the cases was the case referred by the existing public health agencies.

These findings do not necessarily imply an absence of interest in the matter of maternal hygiene by the health personnel in those municipalities under survey but rather that this field has been considered to be the rightful prerogative of the Order. It has been said that this concession of the responsibility of insuring adequate nursing supervision during the periods of pregnancy and labor for those less financially fortunate, and its attendant obligations in the field of maternal and child hygiene, to a semi-official agency, has on occasion been too willingly made.

However, it is reasonable to presume that this criticism is unfounded and that the community public health nursing staff actually suggest, in many instances, that the contact be made by the family or physician instead of through official channels.

AGE

Five per cent of the cases were under 20 years of age; 24 per cent between 20 and 24 years; 27.5 per cent between 25 and 29; 21.5 per cent between 30 and 34; approximately 15 per cent between 35 and 39. These figures conform to the statistical data secured from other sources.

PERIOD WHEN CONTACT MADE

Much in the way of importance has been placed on the inadequacy of the prenatal supervision extended to those dying as the result of pregnancy. In the report of the Ontario study in 1934¹ only 41 per cent were said to have received adequate prenatal care. The extent of the supervision in the present series can be inferred in part from the time in months when the patient contacted the Order.

In 24.7 per cent the contact was made before the end of the 6th month of pregnancy; 19.6 per cent were made during the 7th and 8th months; and 42 per cent occurred during the 9th month; with 31.6 per cent within 2 weeks of confinement; some 9.2 per cent were first seen during labor.

TIME OF CONTACT WITH PHYSICIAN

The time when the contact with the attending physician was made might also be considered as indicative of the extent of the supervision given. The time of the contact with the physician need not necessarily be coincident with the date of contact with the nurse, in view of the fact that, as previously mentioned, the contact with the doctor must come first.

Twenty-six per cent had already informed their physician of their condition before the beginning of the 4th month of pregnancy, and an additional 26 per cent had seen him before the end of the 6th month. Ten per cent made their initial contact during the 8th, and 6 per cent during the 9th month. Six per cent called him during labor. In 17 per cent, the time of contact was not recorded.

The extent of the medical supervision is unknown. It is, however, a reasonable implication that a significant part of the sustained supervision was left to the nurse following her contact with the patient.

TYPE OF NURSING SUPERVISION

The scope of this supervision was recorded as being either grade 1, 2, or 3, dependent on the time of contact in months, the number of visits made, and the periods elapsing between such visits. It was reported as grade 1 in 807 cases, grade 2 in 1,772, and grade 3 in 1,749. In 714 contact was too late to permit of grading.

PLACE OF DELIVERY

Delivery naturally took place in the home in the vast majority of those served, only 12 per cent being hospitalized. This latter group comprises not only those who were found to require hospital care during delivery but also those who requested the Order to supply only prenatal supervision, having originally planned to be cared for during labor in hospital. In no particular age group was hospital care more prevalent than in the other.

CONDITION ON DISCHARGE

Six weeks' post-natal care is extended; the patient being then ordinarily discharged. The condition of the mother at the time of discharge was noted as being: good in 94 per cent of cases and poor in only 33 cases.

COMPLICATIONS OF PREGNANCY

These were divided into medical and obstetrical, major and minor.

Medical—major: In this group, data were available in 4,261 cases. Heart disease was reported in 22 cases, pneumonia and influenza in the same number, nephritis in 16 instances, high blood pressure in 30, diseases of the thyroid in 5, mental disturbance in 13, others in this group number 32, giving a total of 141 cases, or 3.3 per cent in which some significant complicating illness was present during pregnancy.

Obstetrical—major: Early toxemia—65 cases, early hemorrhage in 85, pyelitis and cystitis in 14, late toxemia in 130, late hemorrhage in 56, late vomiting in 48, other complications 9, being a total of 375, or approximately 9 per cent in which some major obstetrical complication occurred (data for 4,276 cases).

Minor Medical and Obstetrical: Anemia of pregnancy—90 cases, dental caries 1,390 or 30 per cent, upper respiratory infection in 100 cases, phlebitis in 40, abnormal nipples 169, hemorrhoids 20, varicose veins severe enough to be persistently troublesome in 1,106, constipation in 11, and others 21, being a total of 2,363, or 56 per cent of the 4,263 cases in which such information was recorded.

COMPLICATIONS OF LABOR

Malpresentation was recorded in 60 cases, placenta previa in 8, dystocia in 21, and shock in 15, retained placenta in 2.

The following general complications of labor were noted in those delivered at home. *e.g.*, laceration in 792 cases, severe hemorrhage in 62, abnormal placenta in 20, laceration and hemorrhage in 19, and hemorrhage and abnormal placenta in 6 instances.

TYPE OF DELIVERY

Delivery was spontaneous in 75 per

cent of cases, was manual in 2.2 per cent, instrumental in 10.5 per cent, and operative in 0.3 per cent (no data in 11.7 per cent).

PUERPERAL PYREXIA

Pyrexia was defined as a temperature of 100.4 or over on two successive takings, or a single reading on two successive days. Forty-nine of these had a temperature of 100.4–101° in the first 5 days; 25 had such an elevation of temperature for from 6 to 21 days; while 19 had a temperature above 101° in the first 5 days, and 21 were above 101° for from 6 to 21 days.

OUTCOME OF PREGNANCY

Of the 5,059 cases included in this study, 109 aborted, 108 had a miscarriage; 4,681 gave birth to a living infant, and in 158 cases the infant was born dead. In 15 cases the mother died; only 11 of these, however, could be considered as true maternal deaths.

INFANT DEATHS

Those responsible for the conduct of the program of the Order point with pride to the fact that the neonatal death rate of the infants of those attended by the nursing staff is measurably lower than the general rate for the country as a whole. In the group under review, it was under 26.9 per 1,000

live births, in contrast to the provincial rate in Ontario of 32.4.

MATERNAL DEATH RATE

The maternal death rate in the group for the two years in question was 2.4 per 1,000 live births, in comparison with the Ontario rate of 5.3. Five of the 11 deaths occurred in the age group 20–29; 4 among those from 30 to 39, and 2 in the age group 40–49.

CONCLUSION

In conclusion, might we say that while a study of this type may appear to permit of little in the way of conclusion being drawn, we believe that when the statistical analysis is completed the available data will assist materially in placing in the proper sequence some of those factors known to contribute to the maternal morbidity rate, and presumably the mortality rate, and in so doing will be of some value to those who might rightly be concerned with the task of finding some answer to that disconcerting question why in those countries in which the highest percentage of pregnant women are cared for by a physician during the period of labor, is there no lessening in the hazards of child bearing?

REFERENCE

1. Phair and Sellers. A Study of Maternal Deaths in the Province of Ontario. *Canad. Pub. Health J.*, Dec., 1934.

A Health Department Birth Control Program*

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EIGHTEEN months ago the North Carolina State Board of Health became the first to sponsor a health department birth control program. The state has a total population of three and a half million people, over a million of whom are Negroes. Maternal mortality rates have been very high, as have also been the rates of birth and infant mortality. The data on infanticide and abortion are incomplete but competent observers estimate that these rates are too high.

Through a sympathetic attitude in medical and health matters the State Board's *Monthly Health Bulletin* has led the people to write letters presenting their problems and desires. In each of the last several years literally hundreds of underprivileged multiparous or organically diseased wives have written letters to the State Board of Health pleading for contraceptive advice—13 pregnancies and only 4 living children; 9 pregnancies in 11 years, and now suffering from heart trouble; 26 year old mother with 10th pregnancy and bedridden with cardio-renal disease; and so

on. These women have begged for release from the health hazards to which they are exposed by contraceptive ignorance. They all desire children but they prefer that the babies come in such numbers and with the conception timed for the best health interest of mother and offspring. They want to be better mothers with healthier babies and they feel that being able to say when and under what conditions babies shall come will promote the attainment of these worthy aims.

Fortunately, North Carolina has passed no statutory hindrance to physicians who desire to give contraceptive advice to their patients, and federal statutes do not prevent this. Most physicians, however, have not been adequately taught in medical school regarding their legal rights and limitations, and many have, until recently, considered it illegal to give birth control information. To all except a favored few of their patients, therefore, they have turned a deaf ear to requests for such information. Physicians have been almost as afraid of giving contraceptive advice as they have been with regard to abortion and narcotics, fearing that they might get into legal difficulties on a technicality.

The state has been particularly fortunate in having liberal minded social

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and religious leaders and in having liberal colleges. There has been no organized opposition to the growing liberalism and public interest in behalf of the underprivileged among our people.

DEVELOPMENT OF PROGRAM

Local leaders have given approval and coöperation to the work of the two birth control clinics that have been operated in the state for several years. The first began in 1922 and is still active. Both of these clinics have gradually gravitated into a closer connection with the local health department, although they began under private sponsorship. The work of those more liberal minded and better informed physicians who have given birth control information to certain of their fortunate private patients has also been given general approval.

The North Carolina Maternal Health League was organized in 1935 as an outgrowth from the North Carolina Social Service Conference which in 1932 led a large group of state organizations that have formally given approval to birth control work. For 25 years the Conference has enlisted the active sponsorship and full coöperation of a great many of the state's best leaders in practically all lines of activities. For many years these leaders were active in promoting a better medical and health education program for mothers, but no organized effort toward the establishment of birth control clinics was made either by the Conference or its successor League. For 15 years Dr. George M. Cooper, Assistant State Health Officer, has handled the health education work and edited the *Monthly Health Bulletin* of the State Board of Health. In this connection he has become familiar with the problems and desires of thousands of our people in the state who have written to the State Board of Health for information and help, and he has also been active in

the Social Service Conference and the Maternal Health League work.

Early in 1937 a physician who was especially interested in seeing the public health value of the contraceptive program tested made an offer to the State Board of Health. This included the services for a year of demonstration work of a consultant nurse who had an excellent background of training and experience in organization work. The executive staff accepted this offer and the consultant was assigned to work in the Division of Preventive Medicine, of which Dr. Cooper is Director and in which the state maternal and infant health program is carried out. State Health Department sponsorship of local health department supervision of the giving of contraceptive advice for medical indications officially began April 1, 1937.

ORGANIZATION OF LOCAL PROGRAM

A letter was sent by the Assistant State Health Officer to the local health directors announcing the availability of medical and nursing consultant services for local health departments desiring assistance in the planning of programs for giving contraceptive advice for medical indications. About the same time a similar letter announcing these services was sent by the President of the Maternal Health League to the county welfare officers. The local health officers desiring these consultant services then made their requests to the State Board of Health. At the visit following such requests the nurse outlined the various local adaptations of a birth control program, the technics of birth control usually practised, the methods of selecting patients for the services, the cost of materials, the handling of patients and other similar problems. At this first consultation the health officer usually has arranged conferences between a few local medical and lay leaders and the consultant. If the

health officer then felt it advisable to try to organize a birth control service for his county or city the approval of the local medical society was requested. No request of the local health officer for medical society approval of the contraceptive program has been denied. Medical and nurse consultant services are then made available to those who are to be responsible for carrying out the birth control program of the health department.

OPERATION OF PROGRAM

It has been the policy to give contraceptive advice only to medically indigent mothers. Others are encouraged to go to their family physicians for proper advice. The method of selecting patients has varied according to local health department and medical society preferences. Referral has usually been by local physicians, the welfare department, or the health department medical and nursing staff. The patients have been served on strictly medical indications, and it has been found that these are sufficiently elastic to avoid the denial of service to those deserving it from the health department. In some health departments instruction is carried out altogether in clinics operated by the health officer or by local private physicians, in others the private physicians accept referral of patients for instruction and distribution of materials furnished through the health department, while in some others a large part or all of it is carried out through home visits by the public health nurses after investigation and approval by the health officer.

Considerable thought has been given to available contraceptive methods adaptable to a health department program. In most locations the sponge and foam powder technic has been the method of choice and only 5 clinics use an alternate method (diaphragm and jelly) in the health department work.

The sponge and foam powder technic has the great advantage that materials can be distributed and adequate simple instructions given without requiring a large investment of a physician's time. Careful records are kept of all cases so that an accurate estimate of its effectiveness can be compiled. Even if it should eventually be proved that the effectiveness of the method selected is less than that of the more intricate methods, it is believed that it will make possible the reaching of a larger number of mothers and thus eliminate many undesirable pregnancies which could not be prevented in any other way.

The health department birth control program has in each case been coördinated with the general maternal and infant health program. The encouragement of having larger families in selected cases and even enabling some couples hitherto sterile to have babies has been as much a part of the program as has the assistance in the prevention of conception wherever medical considerations have justified it.

RESULTS

The sponsorship of local health department contraceptive programs has been carried on quietly. There has been no fanfare, ballyhoo, or over-aggressiveness. Following the announcement of the availability of the consultant service, the difficulty has been to meet the requests from the local health officers, and to begin even to scratch the surface of this great problem. There has been no hurry. Approval by local practitioners has been insisted upon by the State Health Department before inauguration of the program. After 18 months, 56 clinics are operating in 50 of the 100 counties in the state. No attempt has been made to make the service immediately available to great numbers. We have no imposing statistics to offer but, in the short time of operation and with the small number

of patients served, those familiar with conditions know that the medical need and the public desire justify the beginning of the program. Patients and others in the community have expressed appreciation for the services. A total of 1,141 patients have been served during the first 18 months. Though it is still too early to reach an accurate conclusion regarding the effectiveness of the method selected, we have found so far only 6 cases in which it apparently failed and the mentality of 3 of these was very low. Only a very small number (12 out of 1,141) have reported personal objections to the sponge and foam powder on account of unpleasantness, discomfort, irritation, burning or pain. Eventual closer follow-up will undoubtedly show more failures and more cases of irritation, partly at least because of the general low average intelligence, and poor personal hygiene facilities available to the group served.

An interesting by-product of this health department program has been the changed attitude of the local practising physicians in the communities served. The doctors have had their attention called to the availability of desirable contraceptives and to the fact that they may legally advise their use. As a result a great many women not in the indigent group have been given contraceptive advice by their family physicians.

COMMENT

1. The need and desire for a health department birth control program in the state has been observed and for 18 months an organized official attempt has been made to meet this urgent medical need and this public desire.

2. In the progress of the program during this brief trial it is felt that working quietly and ethically, selection of patients from among the medically indigent wives for strict medical indications and insistence upon local medical approval for state sponsorship have each proved helpful.

3. The sponge and foam powder or some comparably simple method seems particularly suitable for use by those being given this preventive maternal health service through health departments.

4. A health department birth control program is an essential part of the maternity and infant public health service and the better selection of pregnancy risks should favorably affect maternal and infant morbidity and mortality conditions in the counties served. To preserve balance in a generalized public health program it is important continually to develop more nearly complete health education programs and to make available the necessary clinical facilities that serve to encourage or prevent conception according to medical indications.

Late-Lactose Fermenting Organisms of the Coli-Aerogenes Group^{*}

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A NUMBER of investigators have reported the transformation of late-lactose fermenting organisms of the coli-aerogenes group to rapidly fermenting types by frequent sub-culture either in simple nutrient media or media containing lactose.¹⁻⁶ Such late-lactose fermenting organisms may belong to either the coli or aerogenes groups, as indicated by the Voges-Proskauer and methyl-red tests. Both indol negative and indol positive types are found. Such organisms have been isolated from the stools of both healthy people and of those ill with diarrhea, from a blood stream infection, and from water supplies. The acquisition of a normal rate of lactose fermentation appears to relate such organisms to the usual types of *B. coli* or *B. aerogenes*. Hershey and Bronfenbrenner,⁶ however, suggested, on the basis of reversion of a rapid-lactose fermenting variant to a non-lactose fermenting strain in a sodium succinate medium, that late-lactose fermenting organisms may not be identical with other lactose fermenting members of the colon group. Similarly, Stokes, Weaver, and Sche-

rago⁷ reported the conversion of late-lactose fermenting organisms (paracoli) to rapid-lactose fermenters and back to late-fermenting types. They concluded that the strains studied were variants of various members of the coli-aerogenes group. It seems clear, then, as Kriebel and others have suggested, that such organisms are as definitely related to fecal contamination as *B. coli* itself.

One is interested in the conditions under which the late-lactose fermenting types may be found in water supplies. It is a common experience that such organisms come to our attention chiefly in water supplies which almost satisfy the Treasury Department's standard, or in highly diluted material. Lewis² has given us an important key which appears to explain the occurrence of late-lactose fermenting organisms in water. He studied the phenomenon of dissociation in mutabile strains of *Escherichia* and *Aerobacter* by the use of synthetic media containing lactose. These non-lactose fermenting variants gave rise to lactose fermenting strains in a proportion of 1:100,000 when grown on nutrient agar. He called attention to the fact that fermentation of lactose depends upon the relative proportion of fermenting and non-fermenting cells present. He found that when a mixture of cells of a strain of Aero-

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bacter was prepared so that it contained 10 per cent of rapid-lactose fermenting cells and 90 per cent of non-lactose fermenting cells it fermented lactose in 12 hours irrespective of the total number of cells in the inoculum. With only 1 per cent of lactose fermenting cells present, the time required for fermentation was increased to 36 hours. Since the delay in lactose fermentation was found to be independent of the total number of cells of the two types in the inoculum, and since rapidly fermenting members of the coli-aerogenes group are commonly present in much greater numbers in a polluted water than the late-lactose fermenting organisms, late fermentation would not be evident in water analysis until some of the volumes of water inoculated contain only one organism. The slow-lactose fermenting organism is unable to grow as rapidly in competition with one capable of utilizing lactose rapidly.

The fact that organisms of the coli-aerogenes group can vary in their ability to ferment lactose and that slow fermenting organisms may be trained to ferment lactose rapidly appears to be well established by the work of Kriebel and others. Little has been offered to explain this variability to lactose fermentation. Hershey and Bronfenbrenner⁶ and Deere, Dulaney, and Michelson⁸ have demonstrated a decreased production of lactase by such slow-lactose fermenting variants.

Karström⁹ has studied bacterial enzymes by a somewhat different technic in order to determine their function. He made use of cells grown on nutrient media to which various carbohydrates were added. These cells were washed, suspended in a suitable buffer solution in the presence of a specific sugar or alcohol, and the rate of acid production noted by titrating the acid produced at successive intervals. In this way he found certain differences in the kind and amount of enzymes

produced. On the basis of this data he classified enzymes as constitutive and adaptive. The constitutive enzymes were always produced regardless of the substrate on which the cells were grown. Adaptive enzymes were only produced by cells when grown on a medium containing the corresponding substrate; e.g., *B. coli* grown in a medium containing lactose produces lactase, as indicated by the rapid production of acid when such cells are washed and placed in contact with lactose in a buffer solution. By using this method, Karström demonstrated that the enzyme lactase was an adaptive enzyme in the strains of *B. coli* and *B. aerogenes* which he studied. Such an enzyme may vary in amount, depending upon the conditions for growth or for synthesis of protoplasm. I suggest a reversal of such a mechanism is involved in the production of late-lactose fermenting types of organisms. In a polluted water the concentration of nutrient material is usually too low to permit active multiplication of cells but certain conditions may exist which may cause a decrease of lactose activity even in the absence of cell multiplication. Hitchner⁴ reported the acquisition of rapid fermentation of melibiose at the same time as rapid fermentation of lactose was acquired by a slow-lactose fermenting strain.

Peterson,¹⁰ in our laboratory, has tested an indol negative strain of late-lactose fermenting organism to determine whether or not its lactase was an adaptive enzyme as is true for *B. coli*. This strain was isolated from the intestinal tract of an infant ill with acute diarrhea.* In this organism lactose fermentation was produced by an adaptive enzyme. The lactase response in the presence of ammonium salts was much slower than for *B. coli* and *B.*

* Culture was obtained from Dr. E. R. Krumbiegel, Milwaukee Health Department.

aerogenes. This is additional evidence of the relationship of a late-lactose fermenting organism to members of the coli-aerogenes group.

One may consider the pathogenicity of late-lactose fermenting organisms in much the same way as one would consider the pathogenicity of *B. coli* or of strains of *Aerobacter*. Feldman¹¹ has reported a ratio of 5:4 for the occurrence of *Escherichia-Aerobacter* infections of the urinary tract. She regards the *Aerobacter* infections as being more toxic than those due to *B. coli*. The author¹² reported the occurrence of unusually high agglutinin titers in patients recovered from gastroenteritis when tested with a strain of late-lactose fermenting organism.

The following is a striking example of the pathogenicity of a strain of late-lactose fermenting organism obtained in pure culture from the blood of a previously healthy adult male. This patient had been well until March 11, 1937. On the morning of March 11 he did not feel well. He observed a slight diarrhea and was without any reserve energy. He went to work, but headache and dizziness developed and became so severe that he returned home about 11 o'clock. Although he ate a sandwich, he had no desire for food. He promptly became nauseated and vomited. He became extremely ill and shortly before 1 P.M. his physician was called. His pulse was weak; his blood pressure was systolic 50 millimeters; diastolic 30 millimeters. At times his pulse was not discernible. He was placed in an ambulance and taken to a hospital. He remembered leaving home but recalled nothing further until after he had been in the hospital for a time. A blood culture was taken. Lymphocytes appeared to be absent from the blood and hemoglobin was above normal. The blood culture became positive on March 13. This was plated and several colonies were isolated. All were Gram-

negative, nonmotile, gelatin-negative, indol positive, methyl red positive and Voges Proskauer negative organisms, which fermented lactose only slightly in 5 days. Sucrose was not fermented. A stool specimen obtained on March 14 was plated on Endo's agar. The colonies which developed were almost all colorless and among these were many late-lactose fermenting organisms culturally identical with those isolated from the blood.

Blood was obtained for agglutination on the 3rd, 7th, and 18th days after onset. The first specimen of blood agglutinated the "homologous" organisms from the blood stream at a maximum titer of 1:50. The second specimen agglutinated this organism at a maximum titer of 1:100, and the third specimen agglutinated this organism at a maximum dilution of 1:500. A demonstration of a rising titer of agglutinins is now regarded as indicative of infection. In this case the isolation of the organism from the blood stream should leave little doubt as to the infectivity of this strain of late-lactose fermenting organism.

SUMMARY

1. Transformations of late-lactose fermenting organisms are discussed.
2. An explanation of the occurrence of late-lactose fermenting organisms in water supplies is suggested.
3. A mechanism for the production of late-lactose fermenting organisms is suggested.
4. The pathogenicity of a strain of late-lactose fermenting organism of the colon group is demonstrated.

REFERENCES

1. Kriebel, Ruth M. A Comparative Bacteriological Study of a Group of Non-lactose Fermenting Bacteria Isolated from Stools of Healthy Food Handlers. *J. Bact.*, 27:357-372 (Apr.), 1934.
2. Lewis, I. M. Bacterial Variation With Special Reference to Behavior of some Mutable Strains of Colon Bacteria on Synthetic Media. *J. Bact.*, 28:619-638 (Dec.), 1934.
3. Dulaney, Anna Dean, and Michelson, I. D. *A.J.P.H.*, 25:1241, 1935.
4. Hitchner, E. R., Donagan, E. A., and Alpert, S. *J. Bact.*, 36:18 (Sept.), 1938.
5. Bronfenbrenner, J. J., and Davis, C. R. On

Methods of Isolation and Identification of the Members of the Colon-Typhoid Group of Bacteria. Late Fermentation of Lactose. *J. Med. Res.*, 39:33-37, 1918.

6. Hershey, A. D., and Bronfenbrenner, J. J. Dissociation and Lactase Activity in Slow Lactose-Fermenting Bacteria of Intestinal Origin. *J. Bact.*, 31:453-464 (May), 1936.

7. Stokes, J. L., Weaver, R. H., and Scherago, M. A Study of the Para-Coli Group. *J. Bact.*, 35:20 (Jan.), 1938.

8. Deere, C. J., Dulaney, A. D., and Michelson, I. D. *J. Bact.*, 31:625-633 (June), 1936.

9. Karström, H. *Über die Enzymbildung in Bakterien*. Dissertation, Helsingfors, 1930.

10. Peterson, O. H. Personal communication, 1938.

11. Feldman, Leah. Symposium on Late Lactose Fermenting Organisms. Presented at Annual Meeting of Society of American Bacteriologists, Dec., 1937.

12. Ziegler, N. R. Bacteriology of Epidemic Diarrhea. *A.J.P.H.*, 27:241-246 (Mar.), 1937.

Slow Lactose Fermenters in Water Analysis*

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LATE in the spring of 1938, following a discussion by a few eastern laboratory workers on the advisability of including in the routine estimate of coliform organisms in water those coliforms isolated from primary lactose broth tubes containing only small amounts of gas, your referee was requested to determine, by means of a questionnaire, the trend of opinion on this question among laboratory workers in the United States and Canada. A questionnaire was accordingly prepared and submitted to about 30 laboratory workers who were presumed to be particularly interested in the subject.

QUESTIONNAIRE

Do you consider it advisable, in routine work, to include in the coliform estimate those coliforms confirmed from lactose broth presumptives in which there has been produced, after 48 hrs. incubation at 37° C.:

1. From unfinished or finished waters (coagulated, filtered, treated or filtered-treated, etc.):
 - (a) Less than 5 per cent of gas
 - (b) Less than 10 per cent of gas
2. From natural waters (unfiltered and untreated river, spring, well, lake supplies):
 - (a) Less than 5 per cent of gas
 - (b) Less than 10 per cent of gas

Twenty-five replies, the details of which are shown in Table I, were received.

It will be observed that 15 (Group 1) of the replies unqualifiedly favor inclusion, in the coliform estimate, of coliform organisms confirmed from every lactose broth tube containing gas, regardless of the amount.

A second group of 6 replies indicate that the laboratories concerned disregard certain lactose broth tubes containing small amounts of gas, because of their experience of failure to confirm the presence of coliform organisms from an extremely large proportion of such tubes. The implication is clear that were their experience of confirmation from tubes containing small amounts of gas more favorable, they would include the coliform organisms so confirmed in their coliform estimates.

One reply (Group 3) favors disregard of small amounts of gas only in those lactose broth tubes planted with natural waters.

Only 3 replies (Group 4) frankly express doubt of the sanitary significance of the slow lactose fermenters. One worker considers these organisms to be "attenuated" or "devitalized," to have little sanitary significance, and believes that they may safely be ignored. Another states that, in his experience, "When such slow lactose fermenters are found, even though they prove to be members of the coliaerogenes group, the data so obtained usually fail to agree with the informa-

* Read before the Laboratory Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 27, 1938.

TABLE I

Summary of 25 Replies to the Questionnaire

*Favor Including Coliforms Producing, in
Primary Lactose Broth, the Amounts of
Gas Indicated*

Group	Number of Replies in Group	Treated Waters		Natural Waters	
		5% Gas	10% Gas	5% Gas	10% Gas
1	15	+	+	+	+
2	2	—	+	+	+
	1	—	+	—	+
	1	—	—	—	+
	1	+	+	—	—
	1	—	—	+	+
	—			—	—
	6				
3	1	+	+	—	—
4	2	—	—	—	—
	1	—	?	—	?
	—				
	3				

Reason given for
negative replies in
Group 2: Coliforms
very rarely isolated.
Springs & wells
Lakes & rivers

tion given by the sanitary survey. In our opinion these organisms probably represent attenuated forms and are not indicative of such recent pollution as to be of significance." The third replies: "Our opinion . . . is based on the insistence of our Bureau of Sanitary Engineering that laboratory findings including such coliforms do not agree with field studies and throw considerable doubt upon the safety of supplies known to be in excellent sanitary condition."

A few excerpts from certain of the replies favoring the inclusion of slow lactose fermenters in the coliform estimate are quoted:

1. We know that a predominance of extraneous organisms from whatever cause may exert an influence ranging from partial suppression to complete elimination of the coliform group. For this reason it seems advisable not to miss any opportunity to recover the group organisms remaining viable. . . .

2. From the point of view of fresh feces those specimens which contain coliform organisms which give less than normal amounts of gas are less normal than specimens which

give coliforms with orthodox gas production. I find that such forms do occur in fresh feces. Not usually in large numbers, it is true, but they do occur and occasionally in pure culture. In my work with long-stored feces, I have been impressed by the increase in the fecal suspensions of coliform organisms defective in their gas producing properties. It is my belief that in times of drought and in waters subject to stagnation this factor is of importance. . . .

3. If for certain classes of waters it is deemed advisable to give the results of the sanitary survey precedence over the bacteriological results in forming an opinion regarding the sanitary quality of a supply this might be done, but it should be accomplished in this manner and not by ignoring a predetermined section of the gas forming portions of the sample. Such a procedure of ignoring one section of the coliform organisms isolated (when we know that many factors other than attenuation diminish the amount of gas produced) would tend to nullify the science upon which the test is based. . . .

4. There is in my opinion no scientific reason for assuming that coliform organisms isolated from low percentage gas presumptives have any less sanitary significance than any other coliform isolations. . . .

5. We know little as to the cause of weak fermenters, whether it is due to attenuated strains weakened by purification processes or

if they are indicative of remote sources of pollution. It is conceivable that attenuated strains of coliform bacteria might become greatly rejuvenated under favorable conditions of environment. . . .

6. I think that quite often these traces of gas are of sanitary significance; for instance, we frequently run across a rather bad sample where the 1 c.c. or possibly the 0.1 c.c. portion may be typically positive, and yet one or more of the 10 c.c. portions may show less than 10 per cent of gas with all giving typically positive results on the partially confirmed test. . . .

7. We have good reason to believe that chlorination, storage, the presence of other organisms (particularly *Pseudomonas*) may delay or reduce gas production by typical strains of *E. coli*. Consequently, I feel that the amount of gas produced in primary lactose broth is not a very good indication of the presence or absence of significant members of the colon-aerogenes group. . . .

It is evident that the great majority of the laboratory workers replying to this questionnaire consider slow lactose fermentation to be of possible sanitary significance. Although the question submitted is not one that must necessarily be decided by a majority vote, the weight of experience represented by those who favor including these organisms in the coliform estimate is impressive.

DISCUSSION

The question of the sanitary significance of the presence in water of coli-like organisms that produce small amounts (5 c.c. or 10 c.c.) of gas in lactose broth, upon incubation at 37° C. for 48 hours, has long been the subject of occasional informal discussion by laboratory workers; but in general these slow lactose fermenters have been accepted as genuine members of the coliform group of indicator organisms. The present *Standard Methods of Water Analysis*,¹ for example, includes such organisms in the coliform group as therein defined.

Since it is the usual practice to leave to the control authority the appraisal of

the sanitary significance of the presence in a water of *any* organism of the coliform group, difficulties arising from contradictory evidence furnished, on the one hand, by the laboratory and, on the other, by the field survey of the supply, are usually (although, unfortunately, not always) readily adjusted.

It is well known that coliform organisms frequently derive from sources unassociated with dangerous pollution, such as multiplication in sediments in mains, on wood, on other material of a vegetable nature, on tap washers, and from virgin soil, that such organisms are frequently atypical in character and that many of them are slow lactose fermenters. When, therefore, the cause of an excessive coliform density is determined to be other than that of access of pollution to the supply, the coliform report is simply ignored.

But is there reasonable justification for dismissing as of no sanitary significance *all* instances of slow lactose fermentation? One of the principal arguments favoring this course is that slow lactose fermentation is caused by "attenuated" organisms which have become so "devitalized" that they have lost their sanitary significance. This argument has been so frequently advanced that it deserves particular attention. In the first place, it perhaps will be admitted that the sanitary significance of the presence of coliform organisms in a treated, filtered, or filtered-treated water is ordinarily quite different from that of their presence in a natural water. Coliform organisms in a natural water serve usually as an indicator of the presence of human, animal, or soil pollution; and, depending upon the further indications furnished by the field survey of the supply, greater or less significance is attached to their presence. When a treated, filtered, or filtered-treated water is examined, however, since it is usually known that the original raw water

was polluted, the coliform estimate serves ordinarily, not as an index of pollution that may be more or less dangerous, but rather as a measure of the destruction or elimination, by the treatment, of associated disease organisms. Here there can be no question of tolerance—if the treatment is satisfactory; practically every disease organism of the raw water will have been eliminated and, by the same token, practically every coliform organism will have been eliminated. There exists no satisfactory evidence that slow lactose fermenters are more resistant to treatment than are typhoid or dysentery organisms; nor may it be contended that a treatment which reduces the gas production of a coliform organism 95 per cent necessarily deprives the typhoid bacillus of its pathogenicity. If, therefore, coliforms of *any* type persist in a treated water, and if their presence cannot satisfactorily be explained, the conclusion is inescapable that disease organisms may also persist in the water and that the treatment, therefore, has not been satisfactory.

Turning now to the question of the significance of slow lactose fermenters in natural waters, it must be admitted that the experienced water bacteriologist is inclined to regard the presence of these organisms with some measure of tolerance, not because they are so attenuated that associated disease organisms may be considered to be deprived of their pathogenicity, but because they are encountered with some frequency in relatively unpolluted soil, in sediments in mains, and on plants. On the other hand, it is well known that the presence of other organisms may reduce or even prevent the production of gas by coliform organisms in the lactose broth tube. In a recent study, in the Quebec laboratory, from 144 primary lactose broth tubes which contained only a bubble of gas after

48 hours of incubation, and which eventually yielded positive confirmations, coliforms that produced 5 per cent or more of gas in *secondary lactose* were isolated from 108, or 75 per cent. Rejuvenation of the organisms may have been responsible for some of this increase in gas production, but it must be remembered that the primary lactose broth is, itself, a rejuvenating medium.

Slow lactose fermenters have been shown by Parr⁴ to occur in fresh feces, sometimes in pure culture. Since he finds that they occur occasionally during periods when the normal intestinal function is impaired, the presence in water of certain slow fermenters may be of more than ordinary sanitary significance. Parr⁵ reports further an increase in the proportion of this type of coliform in feces that have been subjected to storage. It is evident therefore, that since the true slow lactose fermenters found in water may have derived from either fresh or stored feces, their presence, even in a natural water, cannot always be considered of no sanitary significance.*

CONCLUSIONS

Since the coliform density of a filtered, treated, or filtered-treated water is a measure of the effectiveness with which the treatment has eliminated disease organisms from the water, it is reasonable to attribute equal sanitary significance to the presence in such water of either typical or atypical coliform organisms, slow fermenters or rapid fermenters.

Slow lactose fermenters are found,

* In the above discussion, no reference has been made to such sources of error as inversion, during sterilization, of lactose to dextrose, and the presence in the broth of entrained air. These may readily be eliminated by exercising care when sterilizing lactose broth, and by incubating the tubes before use overnight, discarding those in which air bubbles are formed. Storage of fermentation-tubes at moderate, rather than very low temperatures may reduce the difficulty caused by entrained air.

although in small proportion, in fresh feces, in greater proportion in stored feces, and occasionally in discharges from cases of gastrointestinal disturbance; the presence of these organisms, even in *natural* waters, therefore, cannot always be dismissed as of negligible sanitary significance. Furthermore, since other organisms contained in the sample may reduce the amount of gas produced in lactose broth by typical coliform organisms, the volume of gas produced cannot be accepted as a sure indication of the type of organism present.

The replies to a questionnaire received from 25 laboratory workers of considerable experience of bacteriological water examination revealed that 15 of these workers favor unqualifiedly the inclusion of slow fermenters in the coliform estimate; 6 apparently favor including the slow fermenters, although in practice they do not attempt isolation from primary lactose broth tubes because in their experience coliform organisms are very rarely isolated from

such tubes; 1 favors including the slow fermenters isolated from filtered and treated waters but not from natural waters; and only 3 frankly express doubt of the sanitary significance of the slow lactose fermenters.

It is evident, therefore, that the great majority of the laboratory workers are opposed to excluding slow lactose fermenters from the coliform group of organisms. In view of the various facts and arguments that may be adduced to support their position, it is suggested that, until sufficient evidence to the contrary is presented, water laboratories are well advised to include, in their routine coliform estimates, *all* coliform organisms confirmed from primary lactose broth.

REFERENCES

1. A.P.H.A. *Standard Methods of Water Analysis*, Eighth Edition, 1936.
2. *Pub. Health Rep.*, 29, 45 (Nov. 6), 1914.
3. *Pub. Health Rep.*, 40, 15 (Apr. 10), 1925.
4. Parr, L. W. The Occurrence and Succession of Coliform Organisms in Human Feces. *Am. J. Hyg.*, 27, 67 (Jan.), 1938.
5. Personal communication.

Slow Lactose Fermenters in Water Analysis*

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IF sanitary importance is to be attached to the finding of slow lactose fermenting, coliform bacilli in water proof of either their close relationship to accepted fecal bacteria or of their etiological rôle in disease must be offered.

We have been interested in slow lactose fermenting and atypical organisms of this type since Dr. Michelson and I^{1,2} isolated *B. coli* mutabile in high percentage from stools of very young babies suffering from an epidemic diarrhea during the winter of 1933-1934. These were the only bacteria consistently demonstrated in cultures from various sources—namely, feces, blood stream, pus from ears, and intestinal contents and heart blood at autopsy. We were very reluctant at the time to assign an etiological rôle to these organisms and we have never felt that the question as to whether they were the responsible agents of disease or whether they represented a marked alteration in the fecal flora as a result of physiological disbalance could be settled. Endo plates spread with fecal suspensions of these babies yielded 90 per cent or more of these organisms and this finding was obtained in 67 per cent of the affected babies.

At that time we also examined stools from normal babies and found the same type of organism in 12 per cent of cases—a finding which accentuated doubt regarding their ability to initiate disease. Since then, we have isolated this curious mutating organism only rarely from stools but we found that slow lactose fermenting and atypical coliforms are often present in the feces of normal and sick babies and adults. It has been our observation that such organisms are more numerous in stools from patients with diarrhea than in stools from normal individuals on stable diet.

In a series of 400 stools approximately 20 per cent were found to contain slow lactose fermenting organisms. We have usually found these organisms in small numbers, but in some specimens they have constituted from 10 to 50 per cent of all colonies. When colorless colonies from Endo's plates were transferred to Russell's Double Sugar agar, a paratyphoid reaction was obtained which was at times misleading. In most cases these slow lactose fermenting organisms have produced acid and gas in lactose broth after 2 to 5 days, though some strains required longer periods of incubation. Accelerated ability to ferment lactose usually followed their daily transplantation to this medium. Saccharose fermenting *Escherichia coli*, *Aerobacter acrogenes*, and intermediate

* Read before the Laboratory Section of the American Public Health Association at the Sixty-seventh Annual Meeting at Kansas City, Mo., October 27, 1938.

types have been identified. Intermediates have been found often enough to warrant them a place among the accepted fecal flora. We well realize that statistical data regarding the incidence of slow lactose fermenting or any other type organism found in feces, or the distribution of types means little, for we have obtained entirely different pictures on plates streaked with diluted fecal specimens from a single individual at different times.

The finding of slow lactose fermenting bacilli in feces has been reported by many workers. They have been regarded as the cause of diarrhea by some, evidence resting on their consistent presence in large numbers in feces of individuals affected. The variation which occurs from time to time in feces of individuals in normal health and on stable diet has been emphasized by Parr.³ He uses the term "fecal-flora-crises" to designate the distortion or temporary elimination of the coli-intermediate group picture. The fact that such a crisis may occur in the feces of normal as well as in diseased individuals makes him doubt the etiological significance of such atypical bacilli. All must admit that the pathogenic properties of these atypical coliforms is very hard to prove. Even their demonstration in large numbers during disease does not rule out the possibility that they may be secondary in character.

Occasionally members of this group are isolated from sources where their etiological rôle cannot be questioned. During the past 3 years we have obtained 10 strains of slow lactose fermenting coliforms from sites other than the intestinal tract. Nine strains came from urine (cystoscopic specimens) and one from the spinal fluid of a child suffering from meningitis. All of these belonged to the *Escherichia* group.

We have found that approximately 50 per cent of the fecal specimens

studied by us contained aerogenes organisms. In some specimens these organisms were absent or few, while in others they were the dominating type organism, and Endo's plates from other fecal samples showed only aerogenes colonies. There seems to be considerable variation in the reported incidence of aerogenes in feces (Brown and Skinner,⁴ Tonney and Noble,⁵ Breed and Norton,⁶ Gray,⁷ Parr⁸). The majority of fecal specimens studied by us have come from hospital wards which may have modified our findings. Aerogenes organisms are only occasionally pathogenic. We have isolated typical bacilli of this type from urine obtained by cystoscope and in one case we demonstrated this organism in 3 successive blood cultures from a patient suffering with a septicemia following a cholecystitis. In a recently studied diarrhea slow lactose fermenting aerogenes organisms were isolated in large numbers from feces at different times. No pathogen was demonstrated. Mucoid coli colonies (Theobald Smith⁹) are found on Endo's plates and it is often impossible to distinguish these from colonies formed by the aerogenes group. If mucoid colonies are fished at random, a good proportion of these will fail to grow in citrate and upon further study will be found to be *Escherichia coli*. These colonies are more frequent on Endo's plates incubated for longer than 24 hour periods.

Recently we became interested in the question of slow lactose fermenting bacilli which might be isolated from waters. We were primarily interested in the incidence and type of organism from such sources. For this study we used waters sent into the West Tennessee Division of the State Public Health Laboratory. Preliminary observations showed that slow lactose fermenters and atypical coliforms could be isolated from polluted and unpolluted waters. This is not a new observation—

Koser's ¹⁰ series of papers have included observations on such organisms found in water. *Escherichia-Aerobacter* intermediates have also been isolated from water by Lewis and Pittman,¹¹ Ruchhoft¹² and his associates, Gray,⁷ Poe,¹³ France,¹⁴ Parr and Caldwell.¹⁵

The series of cultures to be described were all isolated from "negative" waters—waters examined according to the procedure recommended by *Standard Methods* and showing no gas in any of the lactose broth tubes after the usual 48 hour incubation period. A pooled sample from several tubes was diluted and spread on dry Endo's plates. Colorless or colored colonies suggestive of the coliform group of organisms were fished to lactose broth. When fermentation of the lactose broth occurred these cultures were inoculated to Endo's plates and colonies fished to Russell's Double Sugar agar. This culture was subjected to two or three subsequent platings and the final Russell's Double Sugar Agar culture used for inoculation of various media.

These waters (300 in number) came from various sources. Private and semi-private wells in Memphis and public and private wells in Western Tennessee were represented. Three samples were from swimming pools and these were the only treated waters studied. All samples had been collected by trained persons. The interval between the time of collection and inoculation of lactose broth varied from a few hours to 24 hours. The samples from local wells reached the laboratory in an hour or so—those from out of town were usually sent in by special delivery and were not in transit over 24 hours. All specimens were un-iced.

Thirty-nine, or 13 per cent, of the 300 waters contained slow lactose fermenting organisms, "slow lactose fermenting" in that the initial 48 hour growth in lactose broth did not indicate their presence. Approximately 100

strains were isolated but when several of these from one water were of the same type, only one was counted. In most cases the colonies on Endo's plates were abundant, thus suggesting that the organisms had originally been present in the water in fair numbers. These organisms were Gram-negative non-sporulating bacteria producing acid and gas in lactose broth in 1 to 5 days after reinoculation from Endo's agar. Three strains required periods longer than 5 days. Small amounts of gas were usually produced in lactose broth. In most cases a paratyphoid reaction was given on Russell's Double Sugar but in a few instances the reactions were typical of coli.

The distribution included 18 members of the *aerogenes-cloacae* group as judged by lack of indol formation, negative methyl-red, positive Voges-Proskauer reactions, and abundant growth in citrate medium (made according to Koser's formula). Of these organisms, 3 liquefied gelatin. These may have been degraded *aerogenes* (Parr³) or *cloacae* types. All fermented cellobiose and were uric acid positive. Two strains were atypical in that indol was formed.

There were 19 methyl-red positive and Voges-Proskauer negative strains, of which 4 formed indol and grew in citrate medium. Fifteen cultures were indol negative and of these 12 were citrate positive and 3 citrate negative. All but one (an indol negative strain) produced acid and gas in cellobiose. This latter group of organisms would be classed as colon-*aerogenes* intermediates. No typical coli organisms were isolated. We are inclined to regard the intermediates which were indol negative, methyl-red positive, Voges-Proskauer negative and citrate positive as belonging to the *aerobacter* group while the strains which were indol positive, methyl-red positive, Voges-Proskauer negative and citrate positive

would seem to be more closely related to *Escherichia coli*.

No correlation between the source and finding could be established.

The question arises—do such data have any sanitary significance, or are they to be classed as merely interesting and yielding further information regarding the wide distribution of slow lactose fermenting coliform organisms?

As is well known, these atypical organisms may often complicate the confirmatory phase of water examination. An example is offered by one water on our list which is from a series examined monthly. Several times during the past year some of the lactose broth cultures have shown small amounts of gas, and atypical coliform organisms were demonstrated on Endo's plates and in lactose broth subsequently inoculated. Most tests were satisfactory but from these "negative" cultures we isolated the same or closely related organisms. Various factors—seasonal, quantitative, dissociative—may explain the detection of these organisms by routine methods at times, and the failure of detection at other times. Failure of detection by routine methods by no means indicates that they are not present.

Recently, water-borne epidemics of gastroenteritis have been reported which stimulate interest in the question of their potential pathogenicity (Veldee,¹⁶ Ziegler,¹⁷ Pharris, Kittrell, and Williams¹⁸). Ziegler¹⁶ isolated cultures from feces of patients during one of the epidemic periods which were identical in cultural reactions with those found in the city water supply at a time when typical *B. coli* were not demonstrated.

We have no history that any of the waters used in this preliminary study was ever suspected of causing an outbreak of gastroenteritis. Assuming that such occurred, how much significance could be attached to the presence of these organisms—even in large num-

bers—in the absence of fecal coli? One of two admissions must be made—they indicate fecal pollution, sufficiently recent to be significant, or, these organisms are alone capable of producing disease.

How may we determine the fecal or non-fecal nature of these organisms by procedures available in the usual laboratory? What is to be our criterion of pathogenicity?

The majority of these coliforms are intermediates. We have isolated organisms from feces which give identical cultural reactions, but shall we consider them truly fecal bacteria? Carpenter and Fulton¹⁹ found that 13.3 per cent of coliforms isolated from human feces fell into the intermediate group and they conclude that they have sanitary importance. A table in a recent paper by Parr²⁰ indicates that 7.7 per cent of fresh fecal specimens contained these organisms and that this incidence was increased upon storage. His table shows that over half of the intermediates encountered in fresh feces and approximately one-third of those in stored feces were indol negative, methyl-red positive, Voges-Proskauer negative, and citrate positive. It is interesting that 12 of the 39 slow lactose fermenting strains isolated from water fell into this group.

The origin of these intermediate organisms presents an intriguing question. Are they variants—stable or unstable—of better recognized forms? In our laboratory, Michelson² has found that citrate using strains may arise from non-citrate using *B. coli* mutabile. When these organisms were subjected to prolonged growth in lithium chloride broth and later spread on Endo's plates, some colonies formed mucoid papillae which yielded aerogenes-like organisms as regards their methyl-red, Voges-Proskauer and citrate reactions. He was not able to produce this phenomenon with orthodox *Escherichia coli*.

In conclusion, we feel that we must recognize the widespread distribution of such coliform organisms in untreated waters and in waters of apparently satisfactory sanitary state. They may or may not be detected in routine examinations. This finding should invite caution as to interpretation of their presence at any time. The results from sanitary surveys should be carefully applied and such data correlated with bacteriological findings. At the same time we must recognize that their non-fecal origin has not yet been proved and all information regarding their potential pathogenicity should be carefully accumulated and evaluated.

REFERENCES

1. Dulaney, Anna Dean, and Michelson, I. D. A Study of *B. coli* mutabile from an Outbreak of Diarrhea in the New-born. *A.J.P.H.*, 25, 11:1241 (Nov.), 1935.
2. Michelson, I. D., and Dulaney, Anna Dean. Comparative Study of *B. coli* mutabile from an Outbreak of Diarrhea in the New-born. *South. Med. J.*, 29:611 (June), 1936.
3. Parr, Leland W. Sanitary Significance of the Succession of Coli-aerogenes Organisms in Fresh and in Stored Feces. *A.J.P.H.*, 26, 1:39 (Jan.), 1936.
4. Brown, J. W., and Skinner, C. E. Is the Eijkman Test an Aid in the Detection of Fecal Pollution of Water? *J. Bact.*, 20:139 (Aug.), 1930.
5. Tonney, Fred O., and Noble, Ralph E. The Direct Count of Colon-aerogenes Organisms. *J. Infect. Dis.*, 48, 413 (Apr.), 1931.
6. Breed, Robert S., and Norton, John F. Nomenclature for the Colon Group. *A.J.P.H.*, 27, 6:560 (June), 1937.
7. Gray, J. D. Allan. The Significance of Bacterium Aerogenes in Water. *J. Hyg.*, 32:132 (Jan.), 1932.
8. Parr, Leland W. Organisms Involved in the Pollution of Water from Long Stored Feces. *A.J.P.H.*, 28:445 (Apr.), 1938.
9. Smith, Theobald. Notes on Bacillus Coli Communis and Related Forms. *Am. J. Med. Sci.*, 110:283 (Sept.), 1895.
10. Koser, Stewart A. Sanitary Significance of Differential Tests for the Coli-aerogenes Group. *A.J.P.H.*, 17, 11:1178 (Nov.), 1927.
11. Lewis, I. M., and Pittman, E. E. Quoted by Carpenter and Fulton. *A.J.P.H.*, 27, 8:822 (Aug.), 1937.
12. Ruchhoft, C. C., Kallas, J. G., Chinn, Ben., and Coulter, E. W. Coli-aerogenes Differentiation in Water Analysis. *J. Bact.*, 22:125 (June), 1931.
13. Poe, C. F. Quoted by Carpenter and Fulton. *A.J.P.H.*, 27, 8:822 (Aug.), 1937.
14. France, R. L. Studies of Bacterium Coli in Privately Owned Rural Water Supplies. *J. Bact.*, 25:623 (June), 1933.
15. Parr, L. W., and Caldwell, E. L. Variation within the Colon-aerogenes Group as Found in Bacteriologic Analysis of Water from Contaminated Pumps. *J. Infect. Dis.*, 53:24 (July-Aug.), 1933.
16. Veldee, M. V. An Epidemiological Study of Suspected Water-borne Gastroenteritis. *A.J.P.H.*, 21, 11:1227 (Nov.), 1931.
17. Ziegler, Newell R. Bacteriology of Epidemic Diarrhea. *A.J.P.H.*, 28, 3:241 (Mar.), 1937.
18. Pharris, Crit, Kittrell, F. W., and Williams, W. C. A Water-borne Outbreak of Gastroenteritis in a Tennessee Town. *A.J.P.H.*, 28, 6:736 (June), 1938.
19. Carpenter, Philip, and Fulton, MacDonald. Escherichia-aerobacter Intermediates from Human Feces. *A.J.P.H.*, 27, 8:822 (Aug.), 1937.
20. Parr, Leland W. Coliform Intermediates in Human Feces. *J. Bact.*, 36, 1 (July), 1938.

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ARMY MEDICAL LIBRARY NEEDS NEW BUILDING

SOMEWHAT apart from the row of magnificent new government offices in the nation's capital stands a rather decrepit old red brick building. To its dingy halls come the world's foremost medical scholars. They come to consult and examine medico-literary treasures that can be found nowhere else. They come to delve into the history and tradition of medicine, to search for valuable information that will contribute to human welfare. And in seeking and finding this material, they gain not merely knowledge, but inspiration.

In this venerable structure, erected in 1887, is housed the Army Medical Library and Museum. Here is the largest collection of medical books in existence, nearly a million volumes. Here are 450 of the only 600 known medical incunabula, including more first editions than in any other library. Here are ancient documents, one dating from 1467, and numerous rare manuscripts of inestimable value.

This priceless collection of medical literature deserves better quarters. So inadequate is the present building that many books must be stored in the basement. Manuscripts, records, and books that are irreplaceable are exposed to the danger of fire and the hazards of dust, dirt, and decay.

In 1919 a site for a new building for this notable library and museum was acquired on the grounds of the Army Medical Center in Washington. Despite numerous requests and recommendations, Congress has never seen fit to make the necessary appropriation for a suitable edifice. At the last session of Congress, a building costing \$3,750,000 was authorized, but no funds were actually appropriated for the purpose.

This relatively modest appropriation must be made by the present Congress. When the War Department has requested the funds, if it has not already done so, every physician and sanitarian should actively support this important measure.

The Army Medical Library and its indispensable *Index* were once characterized by the late Dr. William H. Welch as America's greatest contribution to medical science. Although established in 1836, the development of this library and of its outstanding services were due largely to the genius of Dr. John Shaw

Billings, one of the founders and early presidents of the American Public Health Association.

This Association urges, therefore, favorable consideration by Congress of an adequate appropriation for the world's foremost library devoted to medicine and public health, in order that this leading scientific institution may be provided with proper facilities for its invaluable collection of medical literature, and also so that it may serve physicians, scientists, and public health workers even more efficiently than in the past.

REFERENCE

A.J.P.H., 26:930 (Sept.), 1936.

HENRY F. VAUGHAN, DR.P.H.—AN APPRECIATION

IT is seldom that a health officer is more signally-honored than was Dr. Henry F. Vaughan of Detroit at the testimonial dinner on January 12, under the auspices of the Detroit Department of Health. Dr. Vaughan has completed twenty-five years of service in the Department, first as an employee of the Division of Sanitation and, since 1918, as Commissioner of Health.

The group which participated in this recognition was significant, not only because of its size—1,050 people were assembled in the Masonic Temple for dinner—but because of the great variety of local individuals and organizations which were represented as a testimonial to the leadership of Dr. Vaughan during his quarter century of service. An illuminated chart comparing the death rates in Detroit in 1913 and 1938 was eloquent testimony to the changes which have taken place in this industrial center where for two decades and more the profession has become accustomed to look for a superlative example of public health administration. Those in attendance could not fail to note the generous credit which Dr. Vaughan gave to his colleagues for the advances which Detroit has made in its health program. It was a subtle revelation of the underlying reason for Dr. Vaughan's undisputed leadership.

Some health officers seem strangely reluctant to allow demonstrations of public approval of their services. Of course it is quite conceivable that these exhibitions might run beyond the limits of proper professional ethics; yet when a public expression is so sincere and spontaneous as was the case in Detroit, it must be conceded that it does a community good to recognize the devoted public service of all such soldiers of the common good. The Association joins with Detroit in congratulating Dr. Vaughan and his distinguished staff.

EQUINE ENCEPHALITIS IN MAN

ONE of the most interesting as well as important medical events in 1938 was the outbreak of equine encephalitis in several parts of the country, notably in New England. In Minnesota an epidemic in horses began in 1934 and the disease was very prevalent in 1937. In New England the outbreak began in Massachusetts in August, 1938. Important as this disease has been from the economic standpoint, the great interest which attaches to it is due to the fact that for the first time there was clear proof of its transmission to man. At the meeting of this Association in Kansas City a paper was read by Dr. Feemster,¹

who gave the details of 8 of these cases and discussed the situation fairly completely. As he said, these 8 cases in Massachusetts, are the first human infections definitely proved to be due to the equine virus. "An entirely new public health problem has been opened up and the equine disease assumes an added importance."

Shortly afterward two papers appeared in a single issue of the *J.A.M.A.*,^{2,3} one reporting 6 cases of human encephalitis which occurred in September, 1937, all in farmers, 5 of whom had been in contact with sick horses. The blood serum of 3 of these patients neutralized the Western strain of equine encephalitis. The authors state that as far as known this was the first time that neutralization of the equine virus by human serum had been found. Both of these papers discussed at some length the agency of insects, especially varieties of mosquitoes, in spreading the disease among horses, some observations concerning which had been made as far back as 1933.

Now we have a report from the Harvard Medical School⁴ on the occurrence of equine encephalomyelitis in ring-necked pheasants on range. The authors suggest that the horse plays only a minor part in the spread of equine encephalomyelitis and that the chief agents in its dissemination are migratory birds. They are inclined to the belief that the term "equine" is misleading as the disease is probably an avian infection, and doubt whether the horse or other domestic animals play any essential part in the perpetuation of this disease. "It may be only under accidental circumstances or when the infection arises to a certain level that it overflows and becomes a serious problem as regards the horse and even the human being."

In his address at Kansas City, Feemster told of the isolation by Fothergill and Dingle of the Eastern type of virus from a pigeon taken from an area in which the horse disease had been prevalent and where these birds had been dying in unusual numbers during the summer of 1937. This observation has now been published in full.⁵ All of the mice injected intracerebrally with both the filtered and unfiltered material died in 48-96 hours with symptoms similar to those of mice infected with equine virus of the Eastern variety. The identification of the pigeon virus was determined by the intracerebral injections of guinea pigs which had been immunized against the Eastern and Western varieties of the virus, and in normal controls.

The writers concluded that this work proved that the virus from this pigeon was that of the Eastern variety of equine encephalomyelitis, the disease having been "spontaneously contracted in an area where equine encephalomyelitis was prevalent among horses." The susceptibility of pigeons was demonstrated as early as 1933 by Giltner and Shahan,⁶ and in 1935 Ten Broeck, Hurst, and Traub⁷ suggested that pigeons might be the host reservoirs of this virus. A number of other observers in this country and in Europe have shown the susceptibility of various birds to the equine virus, including ducks, geese, hawks, black birds, and some others.

That there was a wide field open for study goes without saying. A very recent report⁸ is that epidemics of encephalomyelitis have broken out in the northern part of South America. Material has been sent to the Lederle Laboratories where experiments are now going on. The symptoms of the disease resemble those from the eastern outbreaks of the United States, but it is certain that the virus is significantly different from either of the two known American strains. The Venezuelan strain is immunologically different from either the Eastern or

Western Forms which we know here, but a remote relationship is suggested between the Eastern and Venezuelan strains.

REFERENCES

1. Feemster, Roy F. Outbreak of Encephalitis in Man Due to the Eastern Virus of Equine Encephalomyelitis. *A.J.P.H.*, Dec., 1938, p. 1403.
2. Eklund, C. M., and Blumstein, Alex. The Relation of Human Encephalitis to Encephalomyelitis in Horses. *J.A.M.A.*, Nov. 5, 1938, p. 1734.
3. Wesselhoeft, Conrad, Smith, Edward C., and Branch, Charles F. Human Encephalitis. Eight Fatal Cases, with Four Due to the Virus of Equine Encephalomyelitis. *J.A.M.A.*, Nov. 5, 1938, p. 1735.
4. Tyzzer, E. E., Sellards, A. W., and Bennett, B. L. The Occurrence in Nature of "Equine Encephalomyelitis" in the Ring-necked Pheasant. *Science*, Nov. 25, 1938, p. 505.
5. Fothergill, L. D., and Dingle, John H. A Fatal Disease of Pigeons Caused by the Virus of the Eastern Variety of Equine Encephalomyelitis. *Science*, Dec. 9, 1938, p. 549.
6. Giltner, L. T., and Shahan, M. S. *Science*, 78:63, 1933.
7. Ten Broeck, C., Hurst, E. W., and Traub, E. *J. Exper. Med.*, 62:677, 1935.
8. Beck, C. E., and Wyckoff, Ralph W. G. Venezuelan Equine Encephalomyelitis. *Science*, Dec. 2, 1938, p. 530.

GROWING PAINS

IT is an interesting coincidence that two extensive studies of so-called "growing pains,"* one in England¹ and one in America, should have been published almost simultaneously. Hawksley,¹ though regarding the name "growing pains" as very unsatisfactory, has found that "In spite of the challenging name of this condition it is thus perhaps the most suitable as, evading all concrete questions of aetiology, it describes a condition which is common in the growing human being." For a long time it has been taught almost universally that growing pains were an indication of rheumatism and that children suffering from them were in danger of development of cardiac lesions.

In a discussion before the American Rheumatism Association, Shapiro,² of Minneapolis, made the statement that, in from 8 to 50 per cent of children considered as rheumatic, the condition has been diagnosed on the basis of pain in the extremities alone. At the Lymanhurst Health Center an analysis of the histories of 100 patients with well developed rheumatic heart disease showed that 84 per cent had a definite history of a major attack of rheumatism—either rheumatic fever, or chorea, or both. Of the remaining 16, in practically every instance while there was no history of a major attack of rheumatic infection there was definite evidence of a long continued rheumatic infection.

At the same clinic a follow-up study, continued for 3 years on 200 children who complained only of leg pains, failed to show evidence of chronic rheumatic infection. They are in general good health and none of them have developed chronic heart disease.

T. Duckett Jones, of Boston, in discussing these findings, said, "the so-called growing pains in a child, without a frank history of previous rheumatic fever, do not frequently occur with other manifestations of rheumatic fever or a tendency to develop subsequent rheumatic heart disease. . . . The insidious or asymptomatic development of rheumatic heart disease in children is uncommon but in the young adult it is observed. . . . Mild to severe acute illness is almost invariable, and vague syndromes rarely exist."

Nazum, speaking of how prevalent the belief was that growing pains in children meant rheumatic fever, said that 3 of 6 current medical textbooks he

* Seham and Hilbert attribute the use of the term "growing pains" to Duchamp about 100 years ago. *Am. J. Dis. Child.*, 46:826, 1933.

examined laid stress on the importance of the history of growing pains in arriving at a diagnosis of rheumatic fever. In real rheumatic infections, approximately 75 per cent of children develop clinical evidence of heart lesions, and it is generally believed that every child with rheumatic fever suffers some damage to the heart, about 75 per cent of them having such a degree of inflammation as to produce real damage to the valves or the heart muscle, or to both.

In England (1936) Sheldon¹ analyzed 189 cases of growing pains in the Great Ormond Street Hospital and, after following up for 4 years, found only two who had developed rheumatism with heart lesions and none of them showed chorea. He pointed out that there was no evidence of the histo-pathological changes characteristic of acute rheumatism in growing pains, and that there is no relation between growing pains and sore throats.

In a further series of 24 cases of growing pains followed by Sheldon for 18 to 36 months none developed rheumatic manifestations, making a total of 213 cases of growing pains carefully followed, in which carditis developed in less than 1 per cent.

Of 1,000 children in London and Birmingham seen over 10 years, all those with a history of growing pains were especially studied, and at the Great Ormond Street Hospital, 115 cases of growing pains were subjected to special examinations and 64 of them were followed up after a lapse of 4 years. These children gave a variety of symptoms which are more or less characteristic of such cases, but none of them have shown any evidence of cardiac rheumatism. Taking the cases followed by Sheldon for 4 years with these 64 we have a total of 253 children, only 2 of whom, or less than 0.8 per cent, have developed rheumatic carditis.

The conclusions from these two studies, one in England and one of this country, are that the syndrome of growing pain is not related to rheumatic fever or sub-acute rheumatism and does not provoke rheumatic carditis.

An interesting discussion developed in this study—Does growth of itself produce pain? Shapiro states that he has consulted a number of investigators who are interested particularly in the study of growth, and tried to find out whether or not normal growth in itself might produce such symptoms as are known as growing pains.

No one would commit himself. There are suggestions, however, growing out of the examination of the 115 children mentioned. "There is a frequent history of colds and coughs, vasomotor instability, signs of vague ill health, such as lack of increase in weight, which of itself shows that the pain is not caused by growth. The most common cause was found to be minor orthopedic deformities. Psychological maladjustment was common and "many cases suffered from over-anxious parents, unkind relatives, or unsatisfactory relations with teachers or colleagues at school."

No doubt the result of these studies will be a relief not only to many physicians but also to parents, but they emphasize the importance of careful diagnosis.

REFERENCES

1. *J.A.M.A.*, Nov. 19, 1938, p. 1960.
2. *J. Roy. Inst. Pub. Health & Hyg.*, Oct., 1938, p. 798.

PUBLIC HEALTH EDUCATION *

A Health Best Seller—Nearly 2 full columns in the *New York Times* (Dec. 18, 1938), appeared under these headlines:

Little Book on "Infant Care" Is Government's "Best Seller." Starting out in 1914, Its Various Editions Have Had a Circulation of 11,000,000 and It Has Gone All Over the World.

The article announced a revised edition of a little paper-bound book which "has made its mark in the world because of its distinguished rating among the best volumes on this subject" of infant care.

The author writes interestingly about "Infant Care" and "Pre-natal Care," second best seller, how both pamphlets were written, and how they have been distributed and used. Single copies have been loaned widely, and numerous typewritten copies have been made when it was not understood that the government sold them for only 10 cents each.

They Who Know Want to Know More—That the knowingest people are eager learners was brought out in *The Reporter*, 407 7th Ave., New York, N. Y., Sept., 1939. One of the keenest writers on commercial advertising says there:

Direct mail advertising conventions have been going on for 20 years, and every one that I have ever attended turned out to be an opportunity to learn a lot, no matter how much you knew already.

Maybe it's a fact that people who already know a lot about anything are always eager to learn more. Or maybe it is because

you have to know something in order to know how little you know. I've heard both reasons given.

Possibly a Wrong Approach—Famed "Typhoid Mary," in dying not long ago, rendered service to health education. Her death was seized by alert editorial writers to point a health moral. (We wonder how many alert health educators seized the opportunity by submitting the facts to their local or state editorial writers.) *Baltimore Health News* (Jan., 1939) did a good follow-up. Under "Wrong Career" the *News* reprinted the masthead of the *Baltimore Sun* and its editorial on Mary. The *Sun* made an interesting point which may have further application.

Here is part of the editorial:

Perhaps if Mary Mallon had been approached in the right manner, her pride as a cook could have been directed into a legitimate pride as a typhoid carrier. After all, she was the first recognized carrier of the disease, and she provided the medical profession with a useful living model for the study of typhoid distribution and the means to check it. She might have become more coöperative if it had been made plain to her that she was no common carrier of typhoid, but a very distinguished one.

FOR EDUCATION AND STUDY

The first item below tells of something to pass on to the League of Women Voters—that is, after the staff has read it. The second item is for any group concerned with baby welfare.

If any one doubts the utility of sending letters to legislators, he should read "Write Your Congressman Immediately!" by Dwight Anderson, long connected with the National Tubercu-

* Please address questions, samples of printed matter, criticism of anything which appears herein, etc., to Evert G. Routzahn, 130 East 22d St., New York, N. Y.

losis Association. Mr. Anderson reports on replies to questions sent to senators, representatives, and New York State legislators. Reprinted from *Public Opinion Quarterly*. Ask Medical Society of State of New York, 2 E. 103rd St., New York, N. Y. *Free*.

"Baby's Daily Time Cards" is a group of 7 cards, 5 by 8 inches, hole at the top, with a knotted cord and the suggestion: "Hang this where you can see it every day." One side of card carries a time table, the other, "Training the Baby," with a card for first 4 months, 5th and 6th months, and so on. At foot of each card is reference to a Children's Bureau publication for further information. Single sets *free* from Children's Bureau, Washington, D. C.

A pay envelope series of folders which ought to get read is put out by Tuberculosis and Health Society, 911 Locust St., St. Louis, Mo. Every month, 30,000 copies of a new folder are distributed through industrial and mercantile establishments (sent only upon request to firms willing to distribute them) and to the Society's library racks in branch libraries, hospital dispensaries, etc. The folders are 2¾ by 5 inches, 4 pages on stiff paper (so much better than the flimsy paper sometimes used), limited text and pictures, with modernistic cover which has attention value on a small scale job. The titles:

Don't Take a Chance . . . It Starts by Contact . . . When the Stoplight Signals . . . A Century of Progress . . . and so on.

"Early is the Watchword in Cancer Control" (1 page leaflet); "On the Cancer Front with the Field Army" (folder). Both illustrated. American Society for Control of Cancer, 1250 Sixth Ave., New York, N. Y.

If you wish to look into the possibility that colors may be useful in public health work, see "Color—Our New Star Salesman," by McQueeney and

Podolsky. *Rotarian*, 35 E. Wacker Dr., Chicago, Ill. Jan., 1939. 25 cents. Leads as to color values in printed matter, offices, clinics, equipment, etc., and a reading list.

"Diets of Families of Employed Wage Earners and Clerical Workers in Cities," by H. R. Stiebeling and E. F. Phipard, Bureau of Home Economics, Dept. of Agriculture, Supt. of Documents, Washington, D. C. 140 pp. 15 cents. "What typical American city families are eating and how their diets measure up against nutrition standards." Worth bringing to attention of various groups.

"Social Hygiene: Free and Inexpensive Materials." *American Journal of Nursing*, 50 West 50th St., New York, N. Y. Feb., 1939. 35 cents.

Public Health Nursing, 50 West 50th St., New York, N. Y. (reprints):

The Serum Treatment of Pneumonia, by Rogers and MacChesney (25 cents) . . . Cerebral Palsy, by W. M. Phelps (20 cents) . . . "What's Done We Partly May Compute" (retirement age, etc., etc.) by M. Reid (20 cents).

American Social Hygiene Assn., 50 West 50th St., New York, N. Y.

The Private Physician's Role in the New York City Syphilis Control Activities, by Clarke and Rosenthal . . . This Unofficial Grand Jury (prostitution finding and steps to take) by B. Johnson (10 cents) . . . Gonorrhea—Step-child of Medicine, by E. L. Keyes (10 cents) . . . Catholic Attitude Toward Some Hygienic Legislation, by F. P. Cavanaugh . . . Advice from a Lawmaker (drafting legislation, arousing public opinion, leadership) by T. C. Desmond (10 cents).

FROM THE HOUSE ORGANS

Vigorous editorials or "letters to the editor" on public health topics and quoted from 4 newspapers in *Bulletin*, Dept. of Health, Lincoln, Neb.

The Jenner inquiry has brought to us a life sketch of Eduardo Jenner, "Heroe de la Medicina Preventiva," in *Saludy Sanidad*, Secretaria de Sanidad y Beneficencia, Havana, Cuba.

Probably most of our active educators already are on the mailing lists of *Briefs*, Maternity Center Assn., 1 E. 57th St., New York, N. Y. It brings a wealth of material "for those interested in promoting better maternity care in the United States."

The Bulletin, issued by the 3 national nursing bodies, 50 West 50th St., New York, N. Y., seeks to facilitate being passed around the office. A routing blank is printed in the upper right hand corner of the first page. Under "Pass On To:" are 5 blank spaces for initials or names.

"The Problem of Marihuana" is reprinted by *Connecticut Health Bulletin*, Hartford (Nov., 1938), from *Connecticut Policemen's Journal* for which the article was written by Dr. Millard Knowlton, of the State Department staff. The same issue includes "Planning Ahead for Connecticut's Health," a broadcast explaining the local health department.

Some simple methods for "Teaching People to Drink Milk" are mentioned by J. V. Latimer in Commonwealth Massachusetts Department of Public Health, Boston. Oct.-Dec., 1938.

"25 Searching Questions" about local health education activities are asked in *Bulletin*, National Tuberculosis Assn. (Feb., 1939). Although directed to the tuberculosis groups, in connection with the Early Diagnosis Campaign, they largely have pertinence as to the health education activities of other groups. See a copy at the local tuberculosis society office. We wish that some one would write a series of "searching questions" for the local health department to use.

REPORTS

"Po-sho-a-neen - azhe-be-ma - de - ze - yun" ("Hello! How is your health today?") and a picture of an Indian Princess, Watassa, appear on the cover page of Michigan Tuberculosis Assn.

annual report for 1938. Several good 2 page spreads of pictures and captions make the report unusually graphic. The 2 pages on health education are well done.

"Guarding the Health of Kern County," annual report of Kern Co. Dept. of Public Health, Bakersfield, Calif., adds two significant words to the formal note of presentation: "To the Citizens and the Honorable Board of Supervisors." As is so usual, important material is placed in the back where it is likely to be missed by many readers. "Future Goals" and acknowledgments for services rendered seem to deserve a place up front.

The department in a city under 50,000 population might well look over the mimeographed annual report of Middletown, N. Y. To transplant the idea would mean mimeographing 12 sheets on a pleasing ivory paper, with plenty of paragraphs, abundant space between paragraphs. Bits of illustration can be copied from various sources, the copying being done by the girl who is good enough to make properly the typewritten stencil. The health officer or his secretary may not be inclined to lighten the report as freely as is done in Middletown, but with the right paper, spacing, and good stencil making, he will have a report that many citizens will read with pleasure. The 1938 Middletown report does not mention the local population, which the non-resident reader might like to know.

"An Appraisal of East Orange's Health Work" claims *the first page after the cover* of the East Orange, N. J., annual report. This page is a group of horizontal bars with solid black to represent the deficiencies in each 100 per cent based on the appraisal form. Next in the report comes a 3 page "Contents," detailed and in good sized type. *After that* comes the formal statement to the Mayor and City Council, followed by

the Health Officer's 3 page introduction. Popular health instruction is given 2 pages. Next to the last heading is given "Recommendations," which seems a mistake. It may not be logical (to some minds), but surely there would be a far greater reading of the "Recommendations" if they were placed immediately after the introductory pages.

One paragraph from "Foreword" of the "winter issue" of *Delaware Health News* (Dover, Del.), and the chapter headings are quoted below:

As time passes, new public health methods are developed, new needs arise, old health enemies are conquered and new ones challenged. Each of these changes represents a new problem. To lay these problems, clearly and concisely, before the people of Delaware is the purpose of this, the winter issue, of the *Delaware Health News*.

Expenditures and Health . . . We Challenge New Opponents! . . . Assume Responsibility! . . . Santa Claus in a New Rôle . . . Give TB the Knockout Blow! . . . Lifting One Hundred Pounds . . . The Laboratory Is Crowded . . . The Needs of the Health of Delaware.

"A Sight Saving Odyssey." How is that for the title of an annual report? Thus is introduced the 1937-1938 record of Illinois Society for Prevention of Blindness, 203 N. Wabash Ave., Chicago, Ill. There are 28 pages, 5½ by 7 inches, on ivory rough finished paper, blue cover, with the officers on the page after the title and the financial report on the last page, and not a heading between. But it survives that handicap more easily than most reports. This is due to the small size of the pages, the wide margins, the size and readability of the type, the leading between lines, and the lively, narrative style, all in the first person, being report by the Secretary, Audrey M. Hayden. It is no formal "Report of the Executive Secretary." The title origin:

. . . I want to describe to you, if I can, a Sight Saving Odyssey—an Odyssey that

covered 67,786 miles this past year—an Odyssey that carried the message of light to 622 towns scattered through all of the 102 counties of Illinois.

MOVIES AND SLIDES

"Preparing Sound Film Strips," by C. R. Thomas. *Educational Screen*. 64 E. Lake St., Chicago, Ill. Oct., 1938. 25 cents.

Full details described and illustrated, of steps in production of effective teaching material in the form of sound-film-strips.

"We Filmed an Idea" might stimulate workable ideas in presenting health; "How Long Is a Scene?" should help to guard against over-long and too short shots in amateur movies; "Undressing the Act" points to taking the clutter out of indoor scenes; "They Missed Ten Best" explains why certain good movies of 1938 failed to win a place in the annual awards (quite practical); "The Clinic" describes and illustrates short cuts and home-made devices. *Movie Makers*, 420 Lexington Ave., New York, N. Y. Jan., 1939. 25 cents.

"Survey on the Utilization of Visual Aids" is based on returns from about 700 schools. Devoted largely to motion pictures, with limited attention film strips, slides, stereographs, etc. Gives a concise view of current practice. It is interesting that 31 per cent of the schools reporting use 16 mm. cameras "for producing films of school activities for exhibit to parents and community groups." Many teachers reported making movie records of special classroom projects. (We wonder if local health people have been coöperating in either direction to secure health pictures.) Victor Animatograph Corp., Davenport, Ia. Free.

"A School Club's Film," by H. R. Clifford in Feb., 1939, *Movie Makers*, 420 Lexington Ave., New York, N. Y. (25 cents), tells how a junior school group learned to produce their own pictures. A project ahead:

We are working in conjunction with the Safety Commission, another special interest class, on a safety film. We can get plenty of generalized safety films from automobile clubs, the police, etc., but we think it will be worth while to make one of our own that will show the hazards of the blind corners in our neighborhood and that will emphasize the particular habits of our boys and girls which need correction. Furthermore, we think that, even if the film is not outstanding (of course, we are going to do our best), the very fact that sixty boys and girls in the school are thinking, planning and working on a safety problem for several months should make the entire school more safety conscious and more careful.

RADIO

The Health League of Canada (105 Bond St., Toronto) has provided a series of 30 talks which are being broadcast locally over 33 stations in 9 provinces.

"The Hospital Breaks Out of Its Walls," by Dr. H. E. Kleinschmidt, is an effective example of the radio talk, and the title of a radio talk. Tells of the extension of hospital services. In *Hospitals*, 18 E. Division St., Chicago, Ill. Nov., 1938. 50 cents.

MAGAZINE ARTICLES

Magazine articles don't take the place of educational material issued by health agencies, but they do have a lot of supplemental values. Are we getting full value from the magazine circulation in our state or city?

"City Doctor," by J. H. Jerger, M.D. *American Magazine*, Springfield, Ohio, Feb., 1939. 25 cents. "Dictators in Our Hospitals," the case for the general practitioner in city as well as country.

"Let's Wipe Out T.B." Editorial. *Collier's*. Oct. 29, 1938.

"Death to the Killer," by J. D. Ratcliff. *Collier's*. Dec. 24, 1938. "A chemical agent has come to the aid of medicine in its battle against . . . pneumonia."

"Bedtime Story," by H. Lees.

Collier's. Jan. 14, 1939. "Scientists have proved that a good rest doesn't necessarily mean unbroken sleep."

"The War on Syphilis." Editorial. *Collier's*. Feb. 4, 1939.

"*Collier's* two years ago (issue of Feb. 6, 1937) became the first popular magazine to utter the word 'syphilis' in cold type, and to talk about this national health termite and its possible extermination in calm, realistic language."

"The Strange Ways of Allergy," by G. W. Gray. How strange they are, their nature; . . . is there a way out? The writer has been highly praised for lucidity, and a passion for accuracy. *Harper's*, 49 E. 33rd St., New York, N. Y. Jan., 1939. 40 cents.

Under "The Five Sisters" is a bar diagram "record of comparative mental ability at different months." Even without the rather inconspicuous color the diagram is an effective example of how standard diagrams may be dressed up. "Dentistry" is 10 pages of pictures and text illustrative of the makings of an effective exhibit. *Life*, 330 E. 22nd St., Chicago, Ill. Jan. 16, 1939. 10 cents.

"Sleep Pills . . . Friends or Enemies?" "Did you know . . . that these popular, non-habit-forming pills . . . may be poison to you?" *Look*, Des Moines, Ia. Oct. 11, 1938. 10 cents.

Seven pages of pictures showing the how and what of automobile accidents; one page. "Of these 8 Babies, 5 will be killed or injured before they are 60." *Look*, Des Moines, Ia. Dec. 6, 1938. 10 cents.

"The Doctors' 'Union.'" The current case of A.M.A. vs. Dept. of Justice is not "union vs. non-union." It is the Sherman Act and personal conduct. *New Republic*, 40 East 49th St., New York, N. Y. Sept. 7, 1938. 15 cents.

"What Aspirin Does to You," by T. S. Harding; "Inoculation for Your Child" (with "Children's Inoculation

Chart"), by G. E. Pendray; "The Only Fattening Food" ("is too much of all foods"), by J. A. Tobey (Sensible "Reducing"). *Your Life*, 354 4th Ave., New York, N. Y. Nov., 1938. 25 cents.

USING THE MAIL

The 4 page letterhead has its place in the educational as well as administrative correspondence of health agencies. The latest we have noted is for a money-raising letter issued by American Social Hygiene Assn., 50 W. 50th St., New York, N. Y. Letter on first page; committee names and officers on second page: "an 8 point program" stated in detail on third page; fourth page left blank. This form seems better in some cases than an extra, different sized enclosure. Probably the association will send a copy on request. For many uses the two inside pages could be lightened by the use of well laid out pictures, the text being limited as much as possible.

A simple way to give a bit of distinction to our mail is to use the special commemorative postage stamps as they appear. When not available locally they can be secured through the official Philatelic Agency, Washington, D. C. At all times a certain variety of back special issues are offered by the Philatelic Agency. Send postal card for a list when you wish to purchase. Feb. 18, 1939, a "Golden Gate International Exposition Commemorative Stamp" will be put on sale in San Francisco, and may soon be offered in other cities.

Imprinted on envelopes by the postage meter of Baltimore Dept. of Health:

YOUR TAX DOLLAR
GIVES
SECURITY
HEALTH PROTECTION
EDUCATION
RECREATION

SCHOOLS

"Dental Health Education," pre-school and beyond, is presented in *Iowa Public Health Bulletin*, State Dept. of Health, Des Moines, Ia. Oct.-Dec., 1938.

"Dental Hygiene: A Guide to the Dental Hygiene Program in the Schools of New York State" is fourth in a "Health Education Series." University of State of New York, Albany, N. Y.

Essays by about 100,000 students were entered in the 1938 contest conducted by the Committee on Tuberculosis among Negroes. The winners are reported in the Jan., 1939, issue of *Bulletin*, National Tuberculosis Assn., 50 W. 50th St., New York, N. Y.

"Evaluation of a Rural School Health Education Project: A Study of Pupil Health Practices," by Grout and Pickup, is particularly helpful for its analysis of the problem, and the statements running through the report as to the limitations of the methods employed. *Milbank Memorial Fund Quarterly*, 40 Wall St., New York, N. Y. Oct., 1938. 25 cents.

"Health Education" is one of the usual headings over reviews and notes in *Public Health Reviews*, Division of Hygiene and Public Health, University of Michigan, Ann Arbor.

"Health Education in the Michigan Curriculum Program," by G. R. Koopman, presents attitudes and understandings and "nature of an effective program." *Michigan Public Health*, Lansing. Nov., 1938.

The school journey, tour, or excursion has long been a recognized educational device. Have health agencies sought for opportunities to cooperate? "School Tours" is a preliminary report on what schools are doing in trips more than one day in time length. *Free* from U. S. Office of Education, Washington, D. C. Reports are invited from schools, as well as suggestions for making better use of the tour idea.

BOOKS AND REPORTS

The History of Bacteriology—
By William Bulloch, M.D. New York:
Oxford University Press, 1938. 422
pp. Price, \$3.75.

Dr. Bulloch has rendered a service to bacteriologists and to the medical profession in general in giving us this history. In 1930 he wrote the chapter on the History of Bacteriology in that monumental work, *System of Bacteriology*, published by the Medical Research Council of England. In 1937 he gave the Heath Clark Lectures, in which he discussed the development of bacteriology, covering much of the same ground as in his history, but adding greatly to its volume. This book is the result.

The author comments on the curious fact that so little has been written on the history of bacteriology. The only book he knows of in which an attempt to study the development of the history of the science was written by Loeffler in 1887, only the first part of which was published. Since Loeffler has been dead some 25 years there seems to be no hope that the second volume will ever appear.

From the small beginnings in 1675, when van Leeuwenhoek saw minute living creatures in rain water, down to the present, a new science has developed which has reached astonishing dimensions. The author has traced the building up of this knowledge, "often by laborious efforts, by tortuous routes, and sometimes through trackless wastes. But one thing is certain: the science of bacteriology is built on broad and sound foundations."

One is reminded again and again in reading this book of the fact that "... it is a sign of a dry age when the great men of the past are held in light esteem" (Osler). With no desire to belittle the work of modern scientists it must be pointed out that the men of whom this book tells were pioneers without what we now consider even moderate laboratory equipment, and often had to combat prejudices sometimes due to religious, ethnological, or other experiences. There were then no honors such as the Nobel Prize, for example, to be awarded. There was no incentive except a love for the scientific truth to urge them on. As a typical example of this, take the work of Bretonneau (1778-1862). While he is remembered by those who remember him at all as the first man to make a careful study of diphtheria (his essay on this subject is a classic than which nothing better has ever been written), he deserves perhaps more credit for being the real founder of the doctrine of specificity of disease as we understand it today. His conclusions came in the face of powerful tenets to the contrary, especially that of Broussais, who through the important position he held at the Val-de-Grace school exerted enormous influence on the medical thought of the time.

The book is logically arranged in chronologic sequence and shows evidence of an enormous amount of research work. That it is marked by accuracy goes without saying.

A well selected bibliography arranged according to the chapters of the book

occupies 65 pages. There are also some 56 pages given to short biographical sketches of early workers in bacteriology. This includes such men as Appert, for example, who did his remarkable work before there was such a thing as a science of bacteriology.

The book is well illustrated and especially valuable in giving excellent illustrations of some of the early apparatus used in the study of bacteriology. We wish this work could be made a part of required reading for all students of bacteriology. The printing and make-up are of the best.

MAZŮCK P. RAVENEL

Housing Yearbook 1938—Edited by Coleman Woodbury. Chicago: Public Administration Service (1313 E. 60 St.) 1938. 315 pp. Price, \$3.00.

This fourth annual "Yearbook of 1938" outlines in a series of papers and reports some of the highlights of the advance of housing along all fronts during the year 1937. Leaders in five Federal Housing Agencies discuss in individual papers the progress made in their respective fields.

Some 78 pages are devoted to a rather complete summary of housing progress made by states and cities.

A "project roll call" lists large-scale rental housing projects giving their location, name, number of living units, owner, supervisory agency, and financial objective. There are other articles on neighborhood rehabilitation, national appraisal forum, foreclosure-procedures and policy, housing in the Third Reich, British housing in 1937, housing management, homestead tax exemption, Greenbelt Towns, architects in housing, and housing in Canada—all of these by leaders in their particular fields.

Coleman Woodbury, Director of the National Association of Housing Officials, and Editor of this book, sums up a busy year in housing progress

along all of the various fronts and outlines the accomplishments and plans for the National Association of Housing Officials. A personnel of committees; a directory of housing agencies of the nation, state and municipalities; a list of new worth while publications, and, a selected bibliography are given in the last 50 pages of the book.

The reviewer was particularly impressed with a paper by Will W. Alexander, Administrator, Farm Security Administration, who wrote on, "Housing Activities of the Farm Security Administration." He states:

The principal job of the Farm Security Administration is to help farm families on or near relief to become self-supporting. Since 1935 it has helped more than 532,000 low-income families to struggle back toward self-reliance and in helping such people reestablish themselves, the Farm Security Administration inevitably was drawn into the field of housing. By January 1, 1938, the Farm Security Administration had completed about 3,370 homes on resettlement projects, and had nearly 7,000 more under construction. The mean value of all farm dwellings in the United States is only \$1,126 and the median farm tenant home is worth only \$472. It is clear, therefore, that families in need of Farm Security Administration can afford only the simplest kind of housing, compatible with minimum standards of sanitation and comfort. When the Resettlement Administration was incorporated in the Department of Agriculture on January 1, 1937, it was determined that the cost of farm homes should be held below specific levels, ranging from \$1,200 to \$2,100 in different sections of the country. In general, these homes are now being built for as little as \$250 a room without bath and \$300 a room with bath.

It seems to the reviewer that if the aims and motives contained in these statements by the Farm Security Administration were made the aim and motive force back of our federally directed urban housing movement, public health authorities would certainly become intensely interested overnight in housing.

In the first article in the yearbook the first purpose of the United States

Housing Act as outlined by Katherine K. Bauer, is given as follows:

To provide financial assistance to the states and political subdivisions thereof for the elimination of unsafe and insanitary housing conditions, for the eradication of slums, for the provision of decent, safe, and sanitary dwellings for families of low income, and for the reduction of unemployment and the stimulation of business activity . . .

It would seem that the last twelve words of this statement of purpose should be an incidental result rather than a driving purpose of any fundamentally sound program to provide minimum standard housing for the poor.

This book is full of thought provoking articles for health officials having any interest in the housing movement of today.

ALFRED H. FLETCHER

The Adolescent—By *Ada Hart Arlitt, Ph.D.* New York: McGraw-Hill, 1938. 242 pp. Price, \$2.00.

Adolescence, between 12 and 21 years of age, is probably the most difficult time in an individual's life, most trying, not only for himself but for the adults who are to guide him. He does not understand his own feelings, his own rapidly maturing body, his constant struggle to make himself felt as an individual. Frequently he is a member of a family in which the parents do not wish their children to grow up to become individuals independent of them; and so, to himself and to his parents, to his teachers and to other adults who come in contact with him he is a very puzzling individual, and all too frequently is called a problem.

Dr. Arlitt's book is one which could be read with profit by all adults. She gives practical advice on ways of meeting the problems of this age in language which makes delightful reading and which shows a rare and sympathetic understanding of adolescence.

ETHEL GORDON

A Manual of Tuberculosis: For Nurses and Public Health Workers—By *Ashworth Underwood.* Baltimore, Md.: Wood, 1938. 404 pp. Price, \$3.25.

In the light of modern developments in tuberculosis control, the increase in the practice of chest surgery, and the more recent conceptions of the method of tuberculous infection in the child, the author has completely revised the earlier edition of this volume which was published in 1931. Three new chapters have been added describing briefly administrative phases of tuberculosis work.

With an orderly presentation of material the book has 18 chapters, the first two of which describe in plain language the general nature of tuberculosis; then come chapters on symptoms, signs, and the course and complications of pulmonary tuberculosis. Following are discussions of sanatorium and medical treatment of the disease with special reference to collapse therapy, operative methods, and diagnosis of treatment. Individual chapters are devoted to tuberculosis in children, and tuberculosis of bones and joints. The use of tuberculin and laboratory methods of diagnosis are given a full chapter. There is a detailed description of nursing duties in sanatorium treatment and on the private nursing of tuberculosis. Other chapters are devoted to light therapy, disinfection, the duties of the nurse in the dispensary, and the post-sanatorium regime including instructions to the patient.

The book was written primarily to prepare the nurse for work in the special field of tuberculosis, but its horizons are even more extensive. The descriptions are unusually clear, the language is simple. Fifty-three illustrations accompany the text. A useful glossary of technical terms and a bibliography for further study are provided. The sum-

maries at the end of the chapters form a syllabus on tuberculosis for nurses and public health workers who will find the volume an excellent source of information. BERNARD S. COLEMAN

Tuberculosis Hospital and Sanatorium Directory, 1938—*New York: National Tuberculosis Association, 1938. 168 pp. Price, \$1.00.*

The National Tuberculosis Association has issued, as of May, 1938, an up-to-date Directory of Tuberculosis Hospitals and Sanatoria in the United States, including institutions in Alaska, Hawaii, Puerto Rico, and the Philippine Islands. Listed alphabetically according to location under the separate states and territories the names of the institutions, 749 in number, are followed by their dates of opening, the types of cases accepted, bed capacities, rates, qualifications of residence of patients admitted, the names of the superintendents and the medical directors, and the persons to whom application for admission should be made. A separate listing is given for Federal Sanatoria and Hospitals which provide facilities for the care of the tuberculous.

The Directory reveals the astonishing development that has occurred in tuberculosis hospital care in the United States since Dr. Edward Livingston Trudeau opened the "Little Red," the cottage of two beds in Saranac Lake in 1885. The erection of sanatoria in state after state following Trudeau's demonstration has been a constant and progressive development until there are now available in continental United States 732 institutions with close to 90,000 beds. Alaska, Hawaii, Puerto Rico, and the Philippine Islands have 17 institutions with approximately 3,100 beds. If and when the hospitals now under construction or definitely provided for are completed there "should be available within the next few years approximately 98,000 beds."

This edition of the Directory shows an increase of 5,869 beds since 1934 when the previous edition was published.

The Directory is useful to tuberculosis specialists, tuberculosis and health associations, departments of health, hospitals, and public welfare, and should be on the desk, for ready reference, of every health and hospital information service in the country. It provides "quick" information. The volume is well printed and has been indexed thoroughly. BERNARD S. COLEMAN

Annual Report of the Surgeon General of the Public Health Service of the United States for the Fiscal Year 1938. *Washington: U.S. Government Printing Office, 1938. 184 pp. Price, \$.60.*

This small volume contains a wealth of information of great interest. Not only does it tell of health conditions in this country but there is also a brief report concerning those in the world in general. Unfortunately such reports are at least 6 months old and sometimes more before they are published.

In the world there were 198,389 cases of cholera reported for 1937, with 101,201 deaths, of which 86 per cent occurred in India. Only 1 case with death was reported in the Philippine Islands. There were 36,000 cases of plague with 22,000 deaths, an increase over 1936. There were reported 137,856 cases of smallpox with 28,000 deaths, a great proportion of which—104,974 cases with 26,447 deaths—occurred in India. Unfortunately, "the United States continues to hold its unenviable position near the top among the nations reporting smallpox incidence. For 1937, 48 states reported a total of 11,673 cases of smallpox, as compared with 7,834 for 1936 and with 7,957 for 1935. The number of cases for 1937 is the highest since 1931, while the number of deaths (30) compares favorably with the average of 26 per

year for the preceding 3 years." Of yellow fever there were 314 cases with 290 deaths, 13 cases of which, with 8 deaths, were the jungle type reported from Peru. The disease was practically confined to Africa and South America. All continents reported the prevalence of typhus fever, with a total of 30,326 cases with 1,753 deaths, an increase over 1936.

For the United States general conditions were favorable. In spite of a small epidemic of influenza during the first quarter of the year, the general death rate for 40 states, District of Columbia, and Hawaii, representing 85 per cent of the total population of the country, was 10.9 per 1,000 as compared with 11.3 for 1936. These figures are preliminary and the final corrected rates by the Bureau of the Census will differ somewhat. However, the provisional rates of the Census indicate a decrease of 3 per cent in 1937 over 1936. These favorable health conditions continued into 1938 and the rate for the first half of 1938 was 10.8 per 1,000, as compared with 11.8 for the corresponding period of 1937. The infant mortality rate showed a decline of more than 8 per cent and maternal mortality also showed an encouraging decrease—from 5.3 for 1936 to 4.6. The tuberculosis mortality rose in 1936, but in 1937 the downward trend was re-established, standing at 49.6 for all forms against 51.7 for 1936.

Studies in Rocky Mountain fever have continued and the known area in which it is found has been extended to include all geographic regions of the United States, New England being the last to recognize its occurrence, with 4 cases reported in Rhode Island in 1937. In all, there were 431 cases and 86 deaths for 1937.

New low death rates were recorded during 1937 for typhoid fever, scarlet fever, diphtheria, tuberculosis, malaria, pellagra, nephritis, and diseases as-

sociated with pregnancy and childbirth.

The leading causes of death for 1937, according to preliminary data, were diseases of the heart, cancer and other malignant tumors, pneumonia (all forms), cerebral hemorrhage and softening, nephritis, accidents (except automobile), and tuberculosis, in the order named.

The personnel of the Service as of July 1, 1938, consisted of a total of 481 officers, of whom 60 were on waiting orders. On the same date the number of reserve officers on active duty was 91. There were also on that date 726 Acting Assistant Surgeons.

The report contains interesting sections telling of the researches being done in the Division of Domestic Quarantine (States Relations), being the public health program under title VI of the Social Security Act.

The whole report is full of meat, but is in such detail that it does not lend itself readily to review. It must be read to be appreciated.

The United States is fortunate in having in the Public Health Service one of the largest, best equipped, and best trained forces of men in public health work that the world affords.

MAZŮCK P. RAVENEL

Foods: Production, Marketing, Consumption—By Jean J. Stewart. New York: Prentice-Hall, 1938. 737 pp. Price, \$3.25.

From crop production to table etiquette here is a book replete with information about foods and of real value to the health officer, nurse, physician, dietician, and food technologist. As much at home in the classroom as in the reference library of a research laboratory, this comprehensive volume will stimulate the layman to think more about foods and at the same time awaken an interest in the expert. The text is well written and easy to read, supplemented, as it is, by illustrations,

charts, and tables. The author has successfully attempted to discuss man's food problems from production and marketing to consumption and human nutrition. No small value lies in the up-to-date bibliography at the end of each chapter.

A description of the individual food-stuffs is presented including a survey of the industry, chemical and bacterial significance, and nutritive values. Classification and government grades and standards are given in most cases. For those foods which are manufactured, a description of the processing steps and the theory behind each is developed including some discussion of the factors affecting quality. In one book covering such a broad subject too much exhaustive discussion cannot be expected. All topics are treated in a concise style but with surprisingly little sacrifice of detail except in very technical matters.

High carbohydrate foods, fruits and vegetables, fats and oils, meats and fish, poultry and eggs, and beverages are discussed in separate chapters. Other chapters include a study of man's relation to the food problem and the food needs of the individual, the family, and the nation. The latter deals with the factors and agencies concerned in promoting a national program of optional nutrition and with cleanliness and sanitation.

The author has taken a modern attitude in coördinating the interests of producers and consumers. However, the educational value of this book does not stop here. The public health worker will find it very informative not only in its text material but also in the appended charts of food consumption statistics and dietary values. In addition, there is a section on meal planning, cooking, and even table service; the food buying guides and shipping season charts are quite useful. Definitions for milk grades and standards for

milk production as defined in the U. S. Public Health Service Ordinance are included, also a personal health data chart including height-weight-age tables compiled by qualified investigators.

A better understanding of the complex interrelationships involved in the social and economic aspects of food is desirable, and through education such as this books offers, life can be made more interesting and more efficient.

C. R. FELLERS

Gould's Pocket Pronouncing Medical Dictionary—By *George M. Gould, M.D.* Revised by *C. V. Brownlow (11th ed.)*. Philadelphia: Blakiston, 1939. 1,056 pp., 218 pp. of tables. Flexible washable fabric binding. Price, \$2.00; Thumb index, \$2.50.

The eleventh edition of this standard work is in a handy size for the use of those for whom the full-size volume is unwieldy.

On the whole it would seem that the abbreviation involved in this small-size dictionary does not seriously reduce its usefulness to physicians, public health workers, medical writers, nurses and many others who need a readily accessible source of information for our rapidly increasing scientific vocabulary.

Having moved the tables to the Appendix, the main body of the volume of more than a thousand pages is left free for the definition of a surprising variety of terms. Any volume in this field which sells close to 900,000 copies has evidence of its utility.

REGINALD M. ATWATER

A Guide to Human Parasitology for Medical Practitioners—By *D. B. Blacklock, M.D., and T. Southwell, D.Sc.* (3rd ed.). Baltimore: Wood, 1938. 259 pp. Price, \$4.00.

The authors are members of the faculty of the Liverpool School of Tropical Medicine. In this third edition most of the book remains the same

as before except for the inclusion of the most recent advances in knowledge. The chapter on malaria has been entirely rearranged in order to facilitate the study of the subject, and the section on Leishmaniasis has been largely rewritten in the light of the most recent investigations.

The book is a brief textbook for students of human parasitology and for practitioners in the tropics. It is on the whole very accurate with regard to the morphological characteristics and life cycles of parasites. The two colored plates and 122 illustrations in the text, most of which appear to be original drawings, are excellent.

An attractive feature which is rarely found in textbooks of parasitology is a series of charts showing the life cycles of most of the helminths. This is included in a section on diagnosis, which is inserted in the chapter on nematodes without being mentioned in the table of contents.

The value of the book is limited by the omission of important points connected with a number of parasites, such as the globulin tests in the diagnosis of kala azar. Clinical symptoms, treatment and prevention are entirely omitted throughout the book. The reviewer believes that the book would receive much wider approval, especially as a textbook for medical students, if these features were added.

HENRY E. MELENEY

Your Chest Should Be Flat—
By S. A. Weisman. Philadelphia: Lippincott, 1938. 145 pp. Price, \$2.00.

This exceedingly well conceived and orderly little book contains the report of a study of the thoracic measurements of 20,000 school children. The conclusion that the deep chested child is slightly more prone to tuberculous infection than the flat chested individual appears to be well substantiated. It

still leaves us somewhat in doubt as to an adequate reason for this observation. The brief chapter on preventive measures is definitely suggestive. In this are recognized the handicaps imposed by substandard economic conditions. It might be suspected that these were the causes of both barrel chest and lowered resistance to infection by the tubercle bacillus. Even so, the careful research makes its significant contribution and represents a study of definite value.

The form and manner of presentation deserves high praise. If more research could be reported in so attractive a manner, its practical value would be notably increased. Illustrations, chapter summaries, and excellent bibliographies add much to the value of the book. Aside from the interesting conclusions regarding physical configuration and susceptibility, the many wise comments on tuberculous infection in childhood lend essential value to the book. It is strongly recommended to readers, both for its form and its content.

KENDALL EMERSON

Fifth Avenue to Farm: A biological approach to the problem of the survival of our civilization—
By Frank Fritts and Ralph W. Gwinn. New York: Harper, 1938. 282 pp. Price, \$3.00.

This analysis of the problem of the eugenic quality of American civilization suggests that historically the best biological specimens have come from farms and small towns. Implications related to the effects of higher birth rates in the rural than in the urban areas, of the migration from farms to cities, and the responsibilities of American colleges and of churches in relation to problems of a changing society are considered. Students interested in population problems and in the interrelationships of the various factors of modern society will be par-

ticularly interested in this study which is likely to provoke controversy as well as to stimulate thinking regarding future trends. IRA V. HISCOCK

Sanitization of the Drinking Glass: Part One, Methods and Procedures—By Jack G. Baker; Part Two, Practical Control, By Raymond V. Stone, D.V.M. Los Angeles: National Association of Sanitarians, Inc., 1938. 60 pp. Price, \$.25.

This concise, comprehensive, handbook will be found a dependable guide by health officers and sanitary inspectors who wish to establish or improve methods which concern the sanitation of public eating and drinking establishments in their communities. The text is entirely practical and is written by individuals of experience who are convinced of the epidemiological significance of the subject which they have studied so systematically and constructively.

In Part One the fundamental demand for clean eating and drinking utensils is presented clearly; however, the difficulty of establishing conclusively exactly where and when infection takes place is definitely realized. It is only in studies made upon large groups under control that data of even approximate accuracy can be obtained.

The responsibility for the adequate sanitation of eating and drinking establishments is put squarely up to the health officer, where it truly belongs, but for a health officer to launch such a "program without giving thought to the industry is a serious mistake." Methods must be devised which are practical as well as effective, which take into consideration the availability of equipment, and which can be adopted and applied with ease and certainty. The fundamental purpose of this publication is to tell the health officer exactly how this is to be accomplished.

A well deserved tribute is given to

individual service paper drinking cups. Their universal adoption would relieve the health officer of one of his most difficult administrative problems.

Probably no section of this work will be found more welcome than that which concerns Inspectional Procedures. Any campaign which has as its aim the sanitation of public eating and drinking establishments must depend, in the main, upon the conscientious work of the sanitary inspector. Even the bacteriological work of the laboratory is very secondary in its ultimate value. Much time has been spent by careful investigators in attempts to find the ideal bacteriological set-up. About all we actually need is a method whose results will indicate the difference between relatively clean and relatively dirty dishes and glasses. There is, however, the need for universal agreement upon a standard technic. There are two reasons for this—among others. The first is that a commonly accepted and applied technic is the only one which will enable health officers to compare the results of their work; the second is that an official standard method carries authority in a court of law. The health officer is already convinced of the value of standard methods; the laboratory man does not want his research hampered even by implication; and the sanitary inspector merely wants to know definitely and clearly what he is to do and how it is to be done. This text permits him to have no further doubt.

Part Two concerns Practical Control. In addition to his thorough discussion of laboratory procedures and the background for such work, Dr. Stone contributes his own observations upon a sediment test for the wash water. For making this test the Wisconsin or the Vacuum Sediment Tester is used. An ounce of the dish water is passed through, and then the disk is removed, pressed upon a small white card, and

dried. It can thus be preserved for any subsequent use, such as exhibition in court.

The tentative procedure suggested by the American Public Health Association Sub-Committee on Standard Methods for the Examination of Dishwashing Devices (published in the 1936-1937 *Year Book*) has been adopted by Dr. Stone. He finds that the temperature of the wash water should not go below 120° F., that the sediment tester makes bacteriological examination of the wash water unnecessary, and that an allowable rim count per drinking glass of 500 colonies is too lenient—he suggests a maximum of 100 colonies.

"An objection that 'standardization impairs progression by discouraging research' is not tenable. Actually research ideas carried concurrently with a standard procedure is the only way to evaluate the degree of superiority (or even inferiority) of the planned innovation. Standard Methods increase the research trend since a measuring rod exists which allows comparisons. Let there be more Standard Methods; more Tentative Methods and fewer Optional Methods."

This work is recommended without qualification to all persons interested in clean public drinking glasses.

A. PARKER HITCHENS

BOOKS RECEIVED

- WATER SUPPLY ENGINEERING. By Harold E. Barrett and James J. Doland. 3d ed. New York: McGraw-Hill, 1939. 690 pp. Price, \$6.00.
- CLASS FERTILITY TRENDS IN ENGLAND AND WALES, 1876-1934. By John W. Innes. Princeton: Princeton University Press, 1938. 152 pp. Price, \$2.50.
- ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1936. Volume 1, with Appendices. Manager of Publications, Government of India Press, New Delhi, India. New York: British Library of Information, 1938. 353 pp. Price, \$1.00.
- REHEARSAL FOR SAFETY. A Book of Safety Plays. By Fanny Venable Cannon. New York: Dutton, 1939. 132 pp. Price, \$1.00.
- POCKET PRONOUNCING MEDICAL DICTIONARY. By George M. Gould. Revised by C. V. Brownlow. 11th ed. Philadelphia: Blakiston, 1939. Over 1000 pp. Flexible, Washable fabric, \$2.00. With Thumb Index, \$2.50.
- BULLETIN No. 1004. Vacuum Operated SterElators by the Everson Manufacturing Co. Chicago, Ill. The Bulletin may be had by writing to Everson.
- FUNDAMENTALS OF PHYSICAL EXAMINATION. By George G. Deaver. Philadelphia: Saunders, 1939. 299 pp. Price, \$2.75.
- A SHORT ENCYCLOPEDIA FOR NURSES. By Evelyn C. Pearce. New York: Dutton, 1939. 686 pp. Price, \$3.50.
- A TEXTBOOK OF ORTHOPAEDIC NURSING. By Evelyn C. Pearce. London: Faber, 1939. 230 pp. Price, \$2.50.
- OH, DOCTOR! MY FEET! By Dudley J. Morton. New York: Appleton-Century, 1939. 116 pp. Price, \$1.50.
- EDUCATION OF THE HANDICAPPED. Volume 1. History. Edited by Merle E. Frampton and Hugh Grant Rowell. Yonkers: World Book Co., 1938. 260 pp. Price, \$2.40.
- SIR THOMAS RODDICK. HIS WORK IN MEDICINE AND PUBLIC LIFE. By H. E. MacDermot. New York: Macmillan, 1938. 160 pp. Price, \$2.00.
- EVALUATION OF A RURAL SCHOOL HEALTH EDUCATION PROJECT. Reprinted from The Milbank Memorial Fund Quarterly. By Ruth M. Strang, Ruth E. Grout, Dorothy G. Wiehl, C. A. Greenleaf and E. Genevieve Pickup. Free upon application to the Milbank Memorial Fund.
- THE SCHOOL HEALTH PROGRAM. Report of the Regents' Inquiry. By C.-E. A. Winslow. New York: McGraw-Hill, 1938. 120 pp. Price, \$1.50.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Safety Last—As the price we pay for our "glorious fourth" we can mark up 25 deaths (mostly little girls burned by sparklers setting fire to flimsy clothes and big boys killed by home-made explosives) and about 8,000 cases of serious injuries such as the loss of eyes, arms or fingers. New Jersey, with an effective fireworks ban had the lowest score, while across the Delaware River, the Keystone State had the distinction of killing and maiming the most.

ANON. Second Annual Summary of Fourth of July Injuries. J.A.M.A. 112, 3:236 (Jan. 21), 1939.

Dental Defects and Diet—All free sugar was taken from the diet of institutional children, a diet which, incidentally, was inadequate from the standpoint of the protective foods. Despite evidences of malnutrition, from 80 to 90 per cent of the children became free of dental caries. Also the oral acidophilus disappeared. When candy and free sugar was fed, the salivary acidophilus bacillus returned and after a period so did dental caries. Acid-producing bacteria determine the occurrence of caries regardless of all other factors. A diet of starches and sugars only affects these germs. If these findings are accepted by all authorities, health educators are going to have a lot of "un-learning" to do.

BUNTING, R. W. Diet and Dental Caries. New York State J. Med. 39, 1:18 (Jan. 1), 1939.

Sprayed Apples and Cabbages—Hinting darkly of "dirty work at the crossroads" this paper pictures the possibility of unrecognized chronic

poisoning by the lead, arsenic, and fluorine used as fruit and vegetable sprays. Difficulties in nutritional research are presented in considering the need for control.

CARLSON, A. J. Some Complications in Nutrition Research. J. Am. Dietet. A. 15, 1:1 (Jan.), 1939.

Why Filing Cases Multiply—Record keeping is considered so important in public health nursing that visits are not counted unless the case record is completed. To what use are the records put? It is assumed they are of value as an influence for more complete follow-up. In this paper it is concluded that the time spent in making the common type of entry is largely wasted in so far as that benefit is concerned. This is not a general condemnation of record keeping.

DERRYBERRY, M. Do Case Records Guide the Nursing Service. Pub. Health Rep. 54, 3:59 (Jan. 20), 1939.

Health for All—Another, and an excellent statement both of the need for, and the proposals to accomplish, a national health program addressed to staid New England, where there is a much more progressive attitude toward modern health problems than "Plymouth Rock" traditions would lead to one to expect.

DRAPER, W. F. A National Health Program. New Eng. J. Med. 220, 2:44 (Jan. 12), 1939.

Can You Remember What You Read?—These suggestions for student nurses about how to study, concentrate, and remember are worth perusal by any health worker who has difficulty making his mind behave. Six good

rules for mental efficiency end the discussion.

KIRSON, H. D. There's Nothing Wrong With Your Mind! *Am. J. Nurs.* 39, 2:117 (Feb.), 1939.

What School Physicians Ought to Know—Herein is discussed the training of school physicians. It is proposed that institutes and teaching centers be created where physicians may learn the elements of school health work, and that educational standards be fixed by State Departments of Public Instruction.

KLEINSCHMIDT, E. E. Special Educational Qualifications for the School Physician. *J. School Health.* 9, 1:13 (Jan.), 1939.

Teaching About Cancer—Beginning a series of articles reviewing the symptomatology and treatment of cancer, this first paper promises a discussion of wider interest than just for the public health nurse to whom it is addressed.

KRESS, L. C. The Nurse's Part in the Control of Cancer. *Pub. Health Nurs.* 31, 2:85 (Feb.), 1939.

Fat Soluble Vitamins—Briefly and skillfully reviewed as in this article, the present-day knowledge of vitamins A and D can be made quite comprehensible to those of us who are not biochemists. The author concludes that an ample and varied diet rich in dairy products will supply all the fat soluble vitamins that the body needs, except during infancy, pregnancy, and lactation; then fish liver oils may be needed.

MEIKLEJOHN, A. P. The Fat Soluble Vitamins. *New Eng. J. Med.* 220, 2:67 (Jan. 12), 1939.

Twenty-five Colleges—Where to go for undergraduate training in sanitary and public health engineering.

MILLER, A. P. Undergraduate Engineering Training in Public Health and Related Activities in Engineering Colleges of the United States. *Pub. Health Rep.* 54, 2:29 (Jan. 13), 1939.

Nurses and Tuberculosis—Tuberculosis constitutes an occupational hazard for public health nurses. Although the number of open cases is decreasing, the nurse is often exposed to the disease. Her only defense is good communicable disease nursing technic. The only way she, or anyone else, can get the disease is from some one of her contacts who has it.

MYERS, J. A. Tuberculosis Among Nurses. *Pub. Health Nurs.* 31, 2:93 (Feb.), 1939.

Creating Good Will—Words of wisdom about the public relations of a municipal water company, every syllable of which would apply equally to any health agency. The paper is commended to all administrators, both for the needed lessons it contains and for the manner of its presentation.

NILES, P. B. Watering the Grass Roots. *J. Am. W. W. Assoc.* 30, 12:1917 (Dec.), 1938.

Preventing Pertussis — Double strength vaccine given subcutaneously in 3 weekly doses appears to confer practical protection. Passive immunity may be achieved by use of hyperimmune serum, if given before the paroxysmal stage is reached. These are two conclusions from an interesting paper reviewing the modern situation in regard to the disease.

SAUER, L. W. Whooping Cough. *J.A.M.A.* 112, 4:305 (Jan. 28), 1939.

ASSOCIATION NEWS

The attention of overseas public health workers is called to the extraordinary opportunity in 1939 of attending the meeting of the American Public Health Association and one or both of the World's Fairs in San Francisco and New York, where special emphasis has been laid on public health exhibits.

Sixty-eighth Annual Meeting, Pittsburgh, Pa., October 17-20, 1939
Headquarters: Hotel William Penn

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

Erb. na Bangxang, M.B., C.P.H., 615 No. Wolfe St., Baltimore, Md., Deputy State Health Officer, Bangkok, Siam
Benjamin S. Black, M.D., Grove Hill, Ala., Clarke County Health Officer
Grover C. Bolin, M.D., Riverside Drive, Orangeburg, S. C., Director, Orangeburg County Health Dept.
Randolph L. Compton, M.D., Greenup, Ky., Director, Greenup County Health Dept.
John F. D. Cook, M.D., State Capitol Bldg., Pierre, S. D., Superintendent, State Board of Health and Medical Examiners
Benjamin M. Drake, M.D., Greensboro, Ala., Hale County Health Officer
Lenor S. Goerke, M.D., C.P.H., 324 Duane, Astoria, Ore., Clatsop County Health Officer
Adelard Groulx, M.D., C.P.H., Dept. of Health, City Hall Annex, Montreal, Que., Canada, Director
Reuben J. Harrington, M.D., Court House, Muskegon, Mich., Director, Muskegon County Health Dept.
Andrew Hedmeg, M.D., Box 332, Natchez, Miss., Director, Adams County Health Dept.
Roscoe P. Kandle, M.D., C.P.H., Tenth District Health Office, Clovis, N. M., District Health Officer
John R. Long, M.D., Marion, Ala., Perry County Health Officer

Bennie A. Moxness, M.D., 165 Capitol Ave., Hartford, Conn., Public Health Physician, Bureau of Venereal Diseases, State Dept. of Health
S. Stewart Murray, M.D., D.P.H., City Hall, Vancouver, B. C., Canada, Senior Medical Health Officer, Greater Vancouver Metropolitan Health Committee
J. Burris Perrin, M.B., C.P.H., 422 State Office Bldg., Denver, Colo., Director, Maternal and Child Health, State Health Dept.
John S. Robertson, M.D., D.P.H., P. O. Box 130, Yarmouth, N. S., Canada, Divisional Medical Health Officer
Livingston B. Sheppard, M.D., Box 708, Paintsville, Ky., Johnson County Health Officer
Thomas B. Snoddy, M.D., Pala, Calif., Field Physician, Mission Indian Agency, U. S. Indian Service
Ellis D. Sox, M.D., C.P.H., 1501 W. Main St., Visalia, Calif., Tulare County Health Officer
Joseph H. Stickler, M.D., Stewart, Nev., In charge of Division of Health, Carson Indian Agency, U. S. Indian Service
Ernest Thompson, M.D., Monroe, Ga., Walton County Health Commissioner
Floyd R. Town, M.D., Mt. Pleasant, Mich., Director, Isabella County Health Unit
Ralph M. Vincent, M.D., M.P.H., 65 Broad St., Rochester, N. Y., Assistant District State Health Officer

Harry Wain, M.D., 612 S. Gilbert St., Ada, O., Physician in charge of Health Service and Instructor of Pharmacy, Ohio Northern University

Frank E. Wilson, M.D., Williamston, N. C., Martin County Health Officer

Laboratory Section

Luther Bowen, Ph.G., 6 N. 4th St., Martins Ferry, O., City Chemist, Dept. of Health
Maurice M. Cahn, B.S., 118 East 28 St., New York, N. Y., Director, Royal Laboratories
Dr. Alne E. Cameron, Health of Animals Division, Department of Agriculture, Ottawa, Ont., Canada, Acting Veterinary Director General

R. S. Fassnacht, A.B., City Hall, Salina, Kans., City Milk Inspector

Barbara N. Johnson, B.S., 837 N. Lafayette Park Place, Los Angeles, Calif., Clinical Laboratory Technician, State Dept. of Public Health

Abraham J. Krell, B.S., Catskill Laboratory, Bureau of Water Supply, Ashokan, N. Y., Bacteriologist

Virginia Moss, 2413 Ronda Vista Drive, Los Angeles, Calif., Student Technician, Los Angeles County Laboratories

Robert C. Perriello, B.S., City Hall, Attleboro, Mass., Public Health Agent and Bacteriologist, City of Attleboro

Dorothy J. Williamson, 5960 Chabolyn Terrace, Oakland, Calif., Student, University of California

Vital Statistics Section

Fern E. French, B.S., 3583 Life Sciences Bldg., Berkeley, Calif., Associate in Vital Statistics, Curricula in Public Health, University of California

Harrison S. Martland, M.D., City Hospital, Newark, N. J., Pathologist, and Essex County Chief Medical Examiner

Public Health Engineering Section

William H. Bates, Millen, Ga., District Supervisor, U. S. Public Health Service

George H. Eagle, B.C.E., State Dept. of Health, Columbus, O., Assistant Engineer
Carson C. Foard, Box 155, Burnsville, N. C., Sanitarian, Avery-Yancey Health Dept.

Ralph E. Fuhrman, B.S. in C.E., Sewage Treatment Plant, Blue Plains, D. C., Assistant Superintendent

Edward Gerner, 129 Main St., Orange, N. J., Sanitary Inspector

Nelson Hall, City Hall, Saginaw, Mich., Supervisor of Sanitation, Dept. of Health

Gus R. Herzik, Jr., M.S., 808 East 30 St., Austin, Tex., Principal Assistant Engineer, State Dept. of Health

Albert W. Hutchison, Jr., B.E., LL.B., Van-

derbilt University, Nashville, Tenn., Director, Short Course for Sanitarian Assistants and Assistant Professor of Civil Engineering
Fred J. Lewis, C.E., Vanderbilt University, Nashville, Tenn., Dean, School of Engineering

Henry C. Mitchell, C.E., Box 239, Hopewell, Va., Health Engineer, Prince George-Hopewell Health Dept.

George A. Perkins, 112 E. Daniel St., Champaign, Ill., Student in Sanitary Engineering, University of Illinois

George W. Schucker, B.E. in C.E., 1101 N. Bentalou St., Baltimore, Md., Chief, Division of Community Sanitation, City Health Dept.

David Smallhorst, 519 Furman, Corpus Christi, Tex., Sanitary Engineer, City-County Health Unit

Charles D. Spangler, C.E., McLeansboro, Ill., District Sanitary Engineer, State Health Dept.

S. Merkel Sperry, 1804 Olive St., Reading, Pa., Chief Chemist, The Utility Management Corporation

Ferdinand A. Yost, 1918 Arthur Avenue, New York, N. Y., Health Inspector, Dept. of Health

Ernest W. Zickert, Court House, Janesville, Wis., Sanitarian, Rock County Sanitary Unit

Food and Nutrition Section

Clyde L. Kern, D.V.M., 11 West 42 St., New York, N. Y., Chief Veterinarian of Quality Control Division, Dairymen's League Co-operative Assoc., Inc.

Child Hygiene Section

Amos Christie, M.D., University of California Hospital, Parnassus & Third Ave., San Francisco, Calif., Lecturer on Maternal and Child Health, Curricula of Public Health

Public Health Education Section

Flora Beutel, 119 Stone, Peoria, Ill., School Nurse

Mrs. May W. Bevens, 125 Oakland Ave., Helena, Ark., Chairman, Public Welfare Dept., General Federation of Women's Clubs

Dale A. Boarts, 116 N. W. Temple, Salt Lake City, Utah, with Lederle Laboratories

James M. Doughty, Jr., A.B., Box 352, Tucumcari, N. M., District Sanitarian, Tenth Health District

Francis W. Manning, B.S., 502 Newberry Ave., Newberry, Mich., Sanitarian, District Dept. of Health

Clara Pennington, 207 Majestic Bldg., Fort Worth, Tex., Executive Secretary, Fort Worth-Tarrant County Tuberculosis Society

Evelyn M. M. Reidy, A.M., LL.B., 2300 Loring Place, Bronx, N. Y., Secretary, Bronx County Medical Society
 Ora G. Ringer, R.N., College St., Wadsworth, O., School Nurse
 Joseph Slavitt, M.D., 2732 Bedford Ave., Brooklyn, N. Y., Medical Inspector, New York City Dept. of Health

Public Health Nursing Section

Georgia C. Bankhead, R.N., Snowflake, Ariz., Public Health Nurse
 Mary Beard, D.Litt., American Red Cross, Washington, D. C., Director, Nursing Service
 Bertha L. Brown, R.N., 1323 Wells, Ann Arbor, Mich., Student, University of Michigan
 Margaret C. Butts, B.S., 40 Monroe St., New York, N. Y., Local Supervisor, Queens Western Staff Nurses, Metropolitan Life Insurance Co.
 Constance E. Carmody, B.A., R.N., Marathon County Health Department, Wausau, Wis., Assistant County Nurse
 Fannie L. Cott, R.N., Johnson, Kans., Public Health Nurse, Stanton County Public Health Service
 Carlita L. Crown, 305 State Bldg., San Francisco, Calif., Assistant Chief, Public Health Nursing Service, State Dept. of Public Health
 Ruth M. Dickerson, R.N., Cimarron, Kans., Gray County Public Health Nurse
 Grace B. Hanson, B.S., 1014-4 St., S. E., Minneapolis, Minn., Student, University of Minnesota
 Clara E. Hoffman, R.N., Fort Duchesne, Utah, Field Nurse, U. S. Indian Service
 Henrietta Hofmann, 121 Bank St., New York, N. Y., Assistant Supervisor, Henry Street Visiting Nurse Service
 Anneke Kollewijn, Box 931, Cortez, Colo., Montezuma County Public Health Nurse
 Mary E. McKay, B.S., 102 Federal Bldg., San Francisco, Calif., District Supervisory Nurse, U. S. Indian Service
 Amye McKee, R.N., Goldendale, Wash., Klickitat County Public Health Nurse
 Alma J. Nielsen, Box 163, Oakley, Kans., County Public Health Nurse
 Nina D. Petersen, R.N., Ogallala, Nebr., Staff Nurse, State Dept. of Health
 Madeleine M. Putnam, B.A., B.A.Sc., Bank of Commerce Bldg., Nanaimo, B. C., Canada, Public Health Nurse, Nanaimo and District Public Health Board

Pearl V. Sayles, 632 S. W. Hall St., Portland, Ore., Student, Oregon Medical School
 Helen M. Smith, R.N., P. O. Box 644, Seward, Alaska, Public Health Nurse, Territorial Dept. of Health
 Clarice R. B. Spindle, B.S., 407 City Hall, Charleston, W. Va., Director-Supervisor, Charleston Public Health Nursing Assoc.
 Bertha M. Tiber, B.S., Box 2822, Juneau, Alaska, Supervisor of Nurses, Alaska Office of Indian Affairs
 Mildred I. Udgaard, B.A., 1221 Willard, Ann Arbor, Mich., Postgraduate course in Public Health, University of Michigan
 Mrs. Alice H. Wasser, 315 E. 77 St., New York, N. Y., Staff Nurse, Assoc. for Improving the Condition of the Poor

Epidemiology Section

Dorland J. Davis, B.S., 615 N. Wolfe St., Baltimore, Md., Rockefeller Foundation Fellow studying at Johns Hopkins School of Hygiene and Public Health
 Jack C. Haldeman, M.D., Territorial Dept. of Health, Juneau, Alaska, Tuberculosis Clinician
 Viola M. Vreeland, R.N., 38 Foote Ave., Pittsfield, Mass., Follow-up Worker of Gonorrhea and Syphilis, Berkshire County House of Mercy Hospital and Fairview Hospital, Great Barrington

Unaffiliated

Frederick J. Adams, B. Arch., 77 Massachusetts Ave., Cambridge, Mass., Associate Professor of City Planning, Massachusetts Institute of Technology
 Charles W. Beasley, M.D., Lyndon, Kans., Osage County Health Officer
 Claire D. Hopper, M.D., Whiterocks, Utah, Field Physician, U. S. Indian Service
 Edward A. Piszczek, M.D., 14 Ivy St., Boston, Mass., Student, Harvard School of Public Health
 Geneve G. Riefling, D.D.S., 3907 Connecticut St., St. Louis, Mo.
 Paul D. Rosahn, M.D., 310 Cedar St., New Haven, Conn.
 Gertrude Sturges, M.D., 1313 East 60 St., Chicago, Ill., Consultant on Medical Care, American Public Welfare Assoc.
 I. Oscar Weissman, M.D., 55 Shattuck St., Boston, Mass., Student, Harvard School of Public Health
 Lillian Wurzel, B.A., 303 State Bldg., San Francisco, Calif., Medical Social Worker, State Dept. of Public Health

NATIONAL HEALTH COUNCIL

AT a recent meeting of the Executive Board, the entire question of continued participation by the American Public Health Association in the activities of the National Health Council was considered, and the Executive Board confirmed the selection and appointment of John A. Ferrell, M.D., Louis I. Dublin, Ph.D., and Reginald M. Atwater, M.D., as delegates to the National Health Council, but on a temporary basis. The Board directed its delegation to inform the National Health Council of its desire for a definite statement as to the present activities of the Council in the field of joint planning and as to any proposed program of action which the Council may have in mind for the immediate

future. In making this request the Board indicated that it is not convinced of the desirability of continued membership in the Council.

ASSOCIATION REPRESENTATIVES

CHARLES F. WILINSKY, M.D., Director of Beth Israel Hospital, Boston, has been reappointed liaison officer between the A.P.H.A. and the American Hospital Association.

W. S. LEATHERS, M.D., Dean of Vanderbilt University School of Medicine, Nashville, Tenn., has been appointed as Association representative to the meeting of the Advisory Council on Medical Education, Licensure and Hospitals, held in Chicago, February 12 and 13.

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge.

Replies to these advertisements, indicating clearly the key number on the envelope, should be addressed to the American Public Health Association, 50 West 50th Street, New York, N. Y.

POSITIONS AVAILABLE

WANTED—(a) Student health physician; state university; some teaching; opportunity graduate training. (b) College nurse; state teachers' college; college degree required; \$125, maintenance; southeast. (c) Public health nurse; some administrative duties;

municipal department of health; middle-west. (d) Public health nurse; to supervise outpatient department, children's hospital; some teaching duties. WRITE: 339, Medical Bureau, Pittsfield Building, Chicago, Ill.

POSITIONS WANTED

HEALTH OFFICERS

(a) Public health physician desires connection; M.D., Virginia; several years' successful private practice; 10 years' public health work during which time he has been promoted continuously; excellent reason for relocating. (b) Health educator; A.B., Wellesley; M.S. in public health from state university; 6 years, teaching physiology and sciences in public schools; 2 years, director of child health education, national organization; 2 years, health counselor and teacher of health education, midwest metropolis; 4 years' social work. For further details, please write

M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago, Ill.

Unusually well qualified and experienced administrator, M.D., Johns Hopkins, M.P.H., Harvard, with broad experience in administering programs of medical care, is available. A404

Experienced public health executive; 10 years as full-time county health officer; 4 years as state commissioner of health, wishes administrative position of responsibility. A403

Physician, M.D., Syracuse University; post-graduate studies in bacteriology and immunology, will consider position as health officer or epidemiologist. Has served as

EMPLOYMENT SERVICE (Cont.)

POSITIONS WANTED (Cont.)

director of county health unit, director of industrial hygiene and medical statistics and venereal disease field survey officer. A305

Physician, M.D., Class A medical school; M.P.H., Harvard School of Public Health; extensive experience in pediatrics and school medical services; also background of county health administration and teaching in medical school, will consider expanded opportunity in teaching or research. A302

Experienced physician, administrator, epidemiologist, and teacher, now employed, with C.P.H. from Johns Hopkins, and 14 years' public health background, will consider position. Prefers epidemiology in city or state department. Excellent references. A355

Physician, M.D., Columbia, experienced as county health officer and superintendent of health, seeks position in public health administration or medical executive work. A396

Physician, M.D., St. Louis University; now completing M.S.P.H., University of Michigan; 10 years' experience as county and city health officer, seeks full-time public health administrative position. A373

Physician with M.P.H. from Harvard, experienced as epidemiologist and in county health administration, also in communicable diseases at state level, seeks responsible position. A392

Physician, M.D., Class A medical school; M.S.P.H., University of Michigan, 1937; now serving as district state health officer, seeks full-time city or city-county administrative position. A367

Physician, M.D., Vanderbilt University; Dr.P.H., Johns Hopkins; experienced as epidemiologist, health officer and professor of preventive medicine, seeks position as administrator or epidemiologist. A397

Physician, M.D., University of Cincinnati; with postgraduate training in venereal disease control, Johns Hopkins; now employed, is available as venereal disease control officer. A363

HEALTH EDUCATION

Experienced teacher in public health and author; M.A., Columbia; now teaching public health nursing and carrying field promotion, wishes broader opportunity to train field personnel in extending health knowledge and interest to the general public, especially through group education, institutes, exhibits and rural programs. H400

Well qualified woman in health education wishes position as health coördinator or health counselor. Has wide experience, and Ph.D. from New York University. H236

Young woman, experienced teacher in health education, with M.S. in Public Health and Hygiene from University of Michigan, seeks position as health coördinator. H398

LABORATORY

Laboratory technician, B.Sc. degree; with experience in Army, state public health laboratory and U. S. Public Health Service field laboratory, seeks position in medical school or university. L379

Woman bacteriologist; B.A., Chemistry, 1933; 5 years' experience in experimental and practical therapeutics including animal work; desires position in public health field. L394

Bacteriologist and pathologist with wide administrative experience; Ph.D., Brown University, will consider leading position in this field. L371

MISCELLANEOUS

Medical social worker, graduate of Tulane University, with 18 years' hospital experience, is available for position; especially interested in programs of public medical care. B401

Experienced teacher of bacteriology and hygiene; M.D., University of Pennsylvania; excellent connections, wishes to secure teaching position. M402

NEWS FROM THE FIELD

NEW YORK UNIVERSITY INSTRUCTION IN PREVENTIVE MEDICINE

A NEW program for instruction in preventive medicine for medical students has been announced by Dr. Currier McEwan, Dean of New York University School of Medicine, made possible by a grant of \$84,000 from the Commonwealth Fund. The new arrangement will comprise studies covering the entire four year period and will be centered around the Department of Preventive Medicine and the Hermann M. Biggs professorship in preventive medicine. Dr. Harry Stoll Mustard, Director of the Department, will be in charge of the program and it will be conducted by a full-time staff of instructors and technicians. Rather than to concentrate studies in preventive medicine on the last two years of the regular medical college work, it will now begin in the freshman year and will include activities at a teaching and research center provided in the facilities of the lower East Side Health District, the use of which has been made possible through the coöperation of the New York City Department of Health.

NATIONAL SOCIETY FOR PREVENTION OF BLINDNESS

THE National Society for the Prevention of Blindness has announced that Lewis H. Carris, managing director, assumed the title of general director on January 1, with Mrs. Winifred Hathaway as associate director.

Eleanor Brown Merrill, an associate director for the past five years and formerly secretary of the Society, becomes executive director, and will relieve Mr. Carris of administrative details.

John M. Glenn, one of the founders of the National Society for the Prevention of Blindness, has been elected an honorary vice-president.

COLORADO PUBLIC HEALTH ASSOCIATION

OFFICERS of the Colorado Public Health Association for 1939 are announced as follows:

Amos L. Beaghler, M.D., *President*
Roy L. Cleere, M.D., *Vice-President*
Helen Cannon, *Secretary*
Omer R. Gillett, M.D., *Treasurer*

UNIVERSITY OF MINNESOTA FELLOWSHIPS

THE University of Minnesota has announced a limited number of in-service fellowships in Public Administration for the academic year 1939-1940. The period of training will extend from the beginning of the fall term through the first term of the summer session, and individual courses of study will be planned for each student depending upon previous preparation, personal interests and the requirements of public service. These in-service fellowships will carry stipends varying in amount from \$1,000 to \$1,500 a year, depending upon the student's experience, his present salary and the number of his dependents. Credit earned in residence at the University during the training period may be applied toward advanced degrees.

Applications for these fellowships for the academic year 1939-1940 are to be submitted not later than April 1, 1939, to the Secretary of the Committee on Training for Public Administration, 13 University Library, University of Minnesota, Minneapolis. Those applicants employed in such functional departments as health and sanitation should have had at least a minimum of preparation in political science and other social sciences. Each applicant must be endorsed by his governmental employer and should secure promise of a leave of absence for the duration of his fellowship year.

VACCINES FOR CHINA

THE Chronicle of the Health Organization, League of Nations, Geneva, reports that in 1938 the Chinese health authorities, faced with the threat of a cholera epidemic, asked the League to supply them with six million doses of vaccines. With the generous support of 13 countries, including the United States, the Health Organization succeeded in less than 4 weeks in procuring eight million doses free of charge.

In thanking the countries concerned, the Council of the League drew special attention to this striking example of the part which the League of Nations can play in the field of international humanitarian assistance.

NORTH CAROLINA SYMPOSIUM
ON SYPHILIS

IT is announced that a Symposium on Syphilis will be held at Duke University, Durham, N. C., March 24-25. This symposium is being sponsored by the North Carolina State Board of Health and Duke University.

The following speakers have been scheduled: Dr. Thomas Parran, Dr. John H. Stokes, Dr. J. Earl Moore, Dr. H. N. Cole, Dr. Paul O'Leary, Dr. P. C. Jeans, Dr. Norman R. Ingraham, Dr. Carl V. Reynolds, and Dr. William deB. MacNider.

HONOLULU MENTAL HYGIENE CLINIC

A CLINIC for mental hygiene was recently established in Honolulu to serve the Territory of Hawaii. Dr. Franklin G. Ebaugh, of Denver, Colo., supervised the organization.

A unit at Queens Hospital has been given over to the clinic to provide hospitalization and treatment facilities. Dr. Edwin E. McNeil, of New York, was to take charge of the clinic October 18. Steps were recently taken to initiate mobile mental hygiene clinics to serve these islands.

LOS ANGELES HEALTH DEPARTMENT
FILM

THE Los Angeles City Health Department has ventured into a new field, as part of its recent annual report. It has recently completed a motion picture, 45 minutes in length, which shows in detail the functions of its various departments.

The film is divided into three reels, as follows: Reel I, Division of Public Health Education; Library; Division of Laboratories; Epidemiology—Quarantine—District Doctors. Reel II, Women's Venereal Diseases; Men's Venereal Diseases; Tuberculosis Division; Nursing Division; Child Hygiene; Housing and Sanitation Division. Reel III, Meat Division; Fruit and Vegetable Division; Rodent Division. A brief statistical summary is given with each division.

NEW YORK TUBERCULOSIS ASSOCIATION
MEETING

THE annual meeting of the New York Tuberculosis and Health Association and of the Tuberculosis Sanatorium Conference of Metropolitan New York will be held at the Hotel Pennsylvania, New York, N. Y., March 2. The morning session will be under the auspices of the Sanatorium Conference, Dr. Foster Murray, Chairman, presiding.

"The National Health Program" will be discussed at the luncheon session, held under the auspices of the New York Tuberculosis and Health Association, Dr. I. Ogden Woodruff, President, presiding. Dr. Abel Wolman, President of the American Public Health Association, will discuss the extent and magnitude of the national health program, and Dr. George Baehr, Chairman of the Public Health Relations Committee of the New York Academy of Medicine, will give the viewpoint of the practising physician.

HOSPITALIZATION INSURANCE IN THE UNITED STATES

THE American Hospital Association has announced that almost three million persons in the United States are participating in non-profit hospitalization insurance. Predicting that 500,000 hospital bills, totaling \$25,000,000, would be paid by non-profit organizations during 1939 to the 600 member hospitals throughout the nation, C. Rufus Rorem, Ph.D., of Chicago, announced that the number of participants had increased 100 per cent during 1938.

DISPOSAL OF OIL-FIELD BRINES

AS a feature of its study of the disposal of oil-field brines, the Bureau of Mines, U. S. Department of the Interior, has just published a report on the construction of seven typical oil-field brine-conditioning plants and their operation in preparing brines for subsurface disposal. The investigation is being conducted in coöperation with the Kansas State Board of Health. Such oil-field brines constitute a source of pollution of water supplies.

One of the major problems in the underground disposal of oil-field brines is the clogging of the subsurface formation in the disposal well by suspended matter in the brines. Pretreatment of brines and subsequent subsurface disposal still remain in the experimental stages due to technical and economic problems involved. Consequently numerous types of brine-conditioning systems and methods of brine treatment attaining varying degrees of success have been developed by entering streams draining oil field areas and by passing into shallow water brining formations which may be used as sources of private and public water supply.

These studies, by Sam S. Taylor, C. J. Wilhelm, and W. C. Holliman, have been published as Report of Investigations 3434, "Typical Oil-field Brine-

Conditioning Systems: Preparing Brine for Subsurface Injection." Copies are available without charge upon request from the Bureau of Mines, Washington, D. C.

A.I.C.P. GUIDES FOR NURSES

THE Guides for Public Health Nurses in the Family Health Series, published by the Association for Improving the Condition of the Poor, New York, have been revised.

The A.I.C.P. announces the following Guides for the use of nurses employed by them:

- No. 1. Child Development
- No. 2. Syphilis
- No. 3. Tuberculosis
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MOBILE X-RAY UNIT FOR VIRGINIA

THE Virginia State Department of Health recently purchased a new mobile X-ray unit because of the increasing demand for X-ray service in rural areas.

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RESPIRATORS FOR BRITISH HOSPITALS

ANNOUNCEMENT has been made that every hospital in the British Empire will be equipped with a respirator. These iron lungs will be furnished by Lord Nuffield, British motor manufacturer and philanthropist, who will turn over one of his factories to the manufacture of this equipment, which he plans to deliver to the hospitals free of charge.

PERSONALS

Central States

CLIFFORD H. GREVES,[†] of the University of Michigan, Ann Arbor, Mich., has been appointed Venereal Disease Statistician to the Michigan Department of Health in Ann Arbor.

DOROTHY ROOD, R.N., Ph.D.,[†] of Columbus, Ohio, who has been in charge of the courses in Public Health Nursing at Ohio State University for the past 3 years, has been appointed Director of Public Health Nursing for Loyola University, Chicago, Ill. Her work will be in connection with that of EARL E. KLEINSCHMIDT, M.D., Dr.P.H.,[†] the Director of the Department of Preventive Medicine, Public Health and Bacteriology in the School of Medicine.

Eastern States

DAVID B. AST, D.D.S.,[†] has been appointed Assistant Director for Oral Hygiene, in the Division of Maternity, Infancy and Child Hygiene, of the New York State Department of Health, Albany, N. Y.

DR. HELEN BALDWIN has been appointed Health Officer of Canterbury, Conn.

DR. SAMUEL S. FARAGO, of Westerly, R. I., has been appointed Health Officer of Pawcatuck, Conn., succeeding the late DR. WILLIAM A. HILLARD.

DR. CHARLES FLYNN is now Acting Health Officer of Hamden, Conn., succeeding DR. GEORGE H. JOSLIN.[†]

EDWARD S. GODFREY, JR., M.D.,* Albany, N. Y., has been reappointed for a term of 4 years as Commissioner of Health of New York State.

GEORGE C. SHATTUCK, M.D.,[†] has been promoted from Assistant Professor to Clinical Professor of Tropical Medicine, in the Harvard Medical School and the Harvard School of Public Health, Boston, Mass.

Southern States

HENRY F. BUETTNER, M.D., of the Baltimore City Health Department, was promoted to the position of full-time Medical Health Officer. Since 1922, he has been instructor in bacteriology and immunology in the University of Maryland Medical School.

DR. HUGH G. CLARK, of Lafayette, Ala., has been appointed Health Officer of Chambers County, succeeding DR. ABRAHAM I. PERLEY, who was awarded a year's graduate study at Harvard University.

DR. JACK A. CRITTENDEN, of Elba, Ala., has been appointed Health Officer of Coffee County, succeeding DR. WILLIAM A. DODSON, JR., who resigned on account of ill health.

GRADY F. MATHEWS, M.D.,[†] of Tahlequah, Okla., has been appointed State Commissioner of Health of Oklahoma, succeeding Charles M. Pearce, M.D. Dr. Mathews since 1936 has been full-time Health Officer in a 5-county health district in Oklahoma. He is a graduate of the University of Oklahoma and has studied at the Johns Hopkins School of Hygiene and Public Health.

G. FOARD MCGINNES, M.D., Dr.P.H.,* has resigned as Director of the Bureau of Communicable Diseases in the Virginia State Department of Health to accept a position in Memphis, Tenn., as Director of the Venereal Disease Demonstration Project. Dr. McGinnes will also serve as Associate Professor of the University of Tennessee, and as Consultant with the Tennessee State Health Department and the U. S. Public Health Service.

DONALD B. McMULLEN, D.Sc., Head of the Biology Department, Monmouth College, Monmouth, Ill., has been appointed Assistant Professor

* Fellow A.P.H.A.

† Member A.P.H.A.

of Bacteriology, in charge of the Division of Parasitology, University of Oklahoma School of Medicine, Oklahoma City, Okla.

FRED L. MOORE, M.D., C.P.H.,† who for 11 years has been County Health Officer of Sullivan County, Blountville, Tenn., has resigned to become Associate Professor in the Department of Preventive Medicine and Community Health of the Long Island College of Medicine, Brooklyn, N. Y.

J. W. ROY NORTON, M.D., M.P.H.,* of Chapel Hill, N. C., Assistant Director of Preventive Medicine of the North Carolina State Board of Health, has been appointed Professor of Public Health Administration in the Division of Public Health, University of North Carolina School of Medicine.

DR. MARTLE F. PARKER, of Greenville, Ala., has been named Health Officer of Butler County, to succeed DR. CHARLES J. FISHER, who is taking graduate work at the Johns Hopkins School of Hygiene and Public Health, Baltimore.

Western States

MARION W. CASKEY, M.D., PH.D.,† of Lewiston, Idaho, has resigned as Health Officer of the North Central Idaho Health District, composed of Nez Perce, Latah, and Clearwater Counties.

DR. JOHN R. CORKERY, JR., has resigned as Health Officer of Spokane, Wash., to engage in private practice.

CHARLES L. COYLE, M.D.,† formerly of Marshfield, Ore., has resigned as Health Officer of Coos County, to engage in private practice in Grants Pass.

DR. FRED CHARLES HARVEY has been appointed Health Officer of Spokane, Wash., succeeding DR. JOHN R. CORKERY, resigned.

DR. RICHARD N. SHERWIN, of St. Helens, Ore., has been appointed Health Officer of Washington County, succeeding DR. DANIEL C. McDONALD, of Hillsboro, Ore., resigned.

Canada

A. J. DOUGLAS, M.D.,* Chief Medical Health Officer of Winnipeg, Canada, will retire April 1, after almost 39 years as head of the city Health Department.

LASSALLE LABERGE, M.D., of Montreal, Que., was recently appointed Director of the Tuberculosis Division of the Ministry of Health of the Province of Quebec.

DEATHS

J. TREICHLER BUTZ, M.D., D.D.S.,* City Health Officer of Allentown, Pa., died December 22. Dr. Butz was a member of the A.P.H.A. for more than 20 years, and in 1922 was elected a Charter Fellow of the Health Officers Section. He was also a Life Member of the Association, having been elected in 1934.

DR. MATHEW J. SHIELDS, of Scranton, Pa., died January 23, at the age of 76. He served with the Red Cross as a Red Cross first aid instructor from February, 1909, until his retirement in June, 1936. In 1909 he was commissioned a first lieutenant in the Medical Reserve Corps, later serving as captain in the Medical Corps during the World War. In 1924 he was made a lieutenant colonel in the same service.

LUCY P. SUTTON, M.D.,† Associate Professor of Pediatrics at New York University, New York, N. Y., died in December.

* Fellow A.P.H.A.

† Member A.P.H.A.

CONFERENCES AND DATES

- American Association for Social Security. New York, N. Y. April 7-8.
- American Association of Anatomists. Boston, Mass. April 6-8.
- American Association of Pathologists and Bacteriologists. Richmond, Va. April 6-7.
- American College of Physicians—23rd Annual Session. Municipal Auditorium, New Orleans, La. March 27-31.
- American Congress on Obstetrics and Gynecology—sponsored by the American Committee on Maternal Welfare, Inc. Municipal Auditorium, Cleveland, Ohio. September 11-15.
- American Library Association. San Francisco, Calif. June 18-24.
- American Medical Association, 90th Annual Meeting. St. Louis, Mo. May 15-19.
- American Public Welfare Association. Buffalo, N. Y. June 20-22.
- American Society of Civil Engineers—Spring: Chattanooga, Tenn., April 19-22. Summer: San Francisco, Calif., July 26-29. Fall: New York, N. Y., September 4-9.
- American Statistical Association—Annual Meeting. Philadelphia, Pa. December 27-30.
- American Water Works Association—59th Annual Meeting. Ambassador Hotel, Chelsea Hotel, Atlantic City, N. J. June 11-15.
- New York Section. Sagamore Hotel, Rochester, N. Y. March 30-31.
- Kentucky-Tennessee Section. Peabody Hotel, Memphis, Tenn. April 10-12.
- Canadian Section. Royal York Hotel, Toronto, Ont. April 12-14.
- Montana Section (following School for Water Works Operators, April 12-13). Park Hotel, Great Falls, Mont. April 14-15.
- Illinois Section. Urbana-Lincoln Hotel, Urbana, Ill. April 20-22.
- Indianapolis Section. Antlers Hotel, Indianapolis, Ind. April 25-26.
- Ohio Section. Van Cleve Hotel, Dayton, Ohio. April 27-28.
- Pacific-Northwest Section. Tacoma, Wash. May 18-20.
- Building Officials Conference of America. Detroit, Mich. May 1-5.
- Civil Service Assembly—Eastern Regional Conference. Asbury Park, N. J. June 14-17.
- Chamber of Commerce of the United States of America—27th Annual Meeting. Washington, D. C. May 1-4.
- Connecticut Public Health Association. May.
- Florida Public Health Association. Jacksonville, Fla. December, 1939.
- International Association of Public Employment Services. New Orleans, La. April 11-13.
- International Cancer Congress—Third. Haddon Hall Hotel, Atlantic City, N. J. September 11-16.
- International Congress of Microbiology—Third. New York, N. Y. September 2-9.
- International Congress of Military Medicine and Pharmacy—Tenth. (First meeting of this Congress, organized at the close of the World War, in the Western Hemisphere.) Washington, D. C. May 7-15.
- Michigan Public Health Association. Lansing, Mich. November 8-10.
- National Conference of Social Work. Buffalo, N. Y. June 18-24.
- National County Officers' Association. Ogden, Utah. July 17-22.
- National Education Association, and affiliated organizations. San Francisco, Calif. July 2-6.
- New York Tuberculosis and Health Association—Tuberculosis Sanatorium

Conference of Metropolitan New York. Hotel Pennsylvania, New York, N. Y. March 2.

Ohio Federation of Public Health Officials. Columbus, Ohio. April 21.

Smoke Prevention Association. Milwaukee, Wis. June 13-16.

Southern California Public Health Association. Long Beach, Calif. January 24, 1940.

South Carolina Public Health Association. Myrtle Beach, S. C. May 29-31, June 1.

State and Provincial Health Authorities of North America—Annual Meeting. Washington, D. C. April 20-22.

State and Territorial Health Officers Conference with the Surgeon General. Washington, D. C. April 20-22.

Western Branch, A.P.H.A. Tenth Annual Meeting. Hotel Oakland, Oakland, Calif. July 24-26.

FOREIGN

British Congress of Obstetrics and Gynecology—11th. Edinburgh, Scotland. April 4-6.

First Mexican Congress on Undulant Fever. Torreon, Mexico. May.

Fourth International Congress of Comparative Pathology. Three Sections: Human Medicine, Veterinary Medicine, and Phytopathology. Rome. May 15-20.

Fifth National Medical Congress of Uruguay. Montevideo, Uruguay. Summer of 1939.

Royal Sanitary Institute of Great Britain. Scarborough, England. July 3-8.

International Federation for Housing and Town Planning. Stockholm, Sweden, July 5-13.

World Federation of Education Associations, Eighth Biennial Congress. Rio de Janeiro, Brazil. August 6-11. (SS. Rotterdam Summer Cruise to South America: from New York, July 5; from New Orleans, July 10; returning to New York August 27.)

Eighth Pan-American Child Congress. San Jose, Costa Rica. August 28-September 4.

International Hospital Congress. Toronto, Ont., Canada. September.

American Hospital Association. Toronto, Ont., Canada. September 25-29.

American College of Hospital Administrators. Toronto, Ont., Canada. September 24-25.

Intergovernmental Conference of American Countries on Rural Hygiene. Mexico City, Mexico. End of 1939 (postponed from November 10, 1938).

New York Hospital Graduate Nurses' Club, 317 West 45th Street, New York, N. Y. Rooms available for women during World's Fair. Times Square location, easily accessible to theatres, shops, and all transportation—on direct route, World's Fair. Moderate prices; restaurant.

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Is the Health Officer Fulfilling His Responsibility in Relation to the Nursing Program?*

GRACE ROSS, R.N., F.A.P.H.A.

Director, Division of Nursing, Department of Health, Detroit, Mich.

TO be given an opportunity to discuss this subject is a great privilege, because the subject is an important and timely one. In trying to reach an answer it seemed better to find one based on the health officer's report of his own practical performance in relation to the nursing program at the present than one based on anybody else's opinion. Eighty-two questionnaires were sent to health officers in cities having a population over 100,000. Sixty, or 74 per cent, replied promptly. Of these, 52, or 63 per cent, presented comparable information and were received in time to be studied. This information is in reference to 2,937 nurses, about one-fifth as many as used by Marian G. Randall in her splendid report.¹ This is a study made in 1937 for the National Organization for Public Health Nursing and is highly recommended to those health officers who wish a comprehensive, country-wide view of this subject. Five health officers who replied buy their public

health nursing service from an already well established, unofficial public health nursing agency. As they function quite independently of the health officer, their data, and also those of the Detroit Health Department, have not been included here.

All but 2 health officers, *i.e.*, 49, provided budget figures. Of these, 45 show a per capita rate for health work of less than one dollar, and 4 a rate of over one dollar. The information requested was limited to the several health services which are included in the Annual Health Conservation Contest, usually called the preventive medical services. The figures given indicate great differences in the number of official public health nurses considered necessary to carry out these services. The amount of money which communities are willing to pay for health may be one reason for this variation. The ratio in 52 cities varies from one official public health nurse for 4,000 to one nurse for 41,000 of the population. Eighteen per cent had one nurse for 5,000 or less, 4,000 being the minimum; 55 per cent had one nurse for 5,000 to 10,000; 14 per cent had one nurse for 10,000

* Read at a Joint Session of the Health Officers and Public Health Nursing Sections of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 27, 1938.

to 15,000; 14 per cent had one nurse for 15,000 and over, one of the latter being 32,000, another 41,000.

The importance of the public health nursing program to the health officer is probably reflected better in the percentage which his nurses bear to his total personnel. Forty-six cities gave answers which show the following: In 20 per cent of the cities, less than 25 per cent of the staff are public health nurses; in 85 per cent, the nursing staff is less than 50 per cent of the total; in 15 per cent, the nursing staff is 50 per cent or more of the total personnel. One city runs as high as 73 per cent; another, 80 per cent. It is interesting to note that in the cities having more than one dollar per capita to spend, the percentage of nursing staff varies from 22.9 per cent to 80 per cent.

The backbone of all public health nursing and the secret of its effectiveness is the preparation of the nursing staff. The health officer predetermines the success of his nursing staff when he accepts the qualities and qualifications which each nurse possesses. We are glad that it has not been necessary for each health officer to make a study individually of this problem, because the National Organization for Public Health Nursing has already done so. The standard known as "Minimum Qualifications for Those Appointed to Positions in Public Health Nursing"² is the result of this very careful study and it was accepted by the American Public Health Association in January, 1936. Because it is recognized as a minimum standard, which is already surpassed by a few departments, it is to be hoped that fewer official health departments will continue to fail in meeting it than is true at present. Only 23 per cent meet these minimum standards; 42 per cent reply that they do not; and another 35 per cent failed to answer.

A study of the questionnaires un-

covers a possible way through which a change might be accomplished. Forty-six, or 69 per cent, of the departments are under civil service. Sixty-four per cent of those departments with less than minimum standards are under civil service. It is obvious that improvement should come through selling the facts to civil service commissions.

In reading over the civil service requirements presented, it is seen that their regulations vary from requiring an "R.N.," which may mean no standards which could contribute much to public health work, to "college matriculation and a certificate in public health nursing or its equivalent." Some lay great store by the "R.N." In most states the "R.N." standard is not even a minimum standard for bedside nursing. It is a compromise reached between the supporters of those who wish the community to be properly nursed and the supporters of those who wish to prey on the community. In many states the "R.N." does not mean that the nurse has had the college education so desirable for a public health background, nor even a first rate high school education. As a matter of fact, at present there are laws in 40 states which require the "R.N.," but only 26 of these include a high school education as a necessary means of obtaining it.³ The "R.N." does not mean that the nurse has been graduated from an affiliated hospital wealthy enough to provide her with adequately prepared teachers nor having patients enough to provide her with sufficient experience even in the limited services which it offers. In most states it is not necessary for the nurse to have practical experience in the care of communicable diseases, tuberculosis, syphilis and gonorrhea, or in mental nursing, and many nurses are still found to be inadequately prepared to do orthopedic nursing.

We realize that for financial reasons

the need for hospitals to exploit student nurses is still acute. That, however, is no reason why the public health field must accept the graduates of those schools of nursing which still fail to provide student nurses with the fundamental preparation upon which later good public health nursing can be built. As an example of the difficulties encountered, in Michigan, whose state law does not require a high school education, the nursing schools have all voluntarily adopted the high school as a minimum standard; yet the following deficiencies in experience, upon which public health work is built, are still to be found: 69 per cent of the schools do not offer actual experience with tuberculosis patients; 60 per cent with other acute communicable diseases; 63 per cent with nervous and mental patients; and as in other states, information concerning syphilis and gonorrhea is not even collected. It is therefore not surprising that 72 per cent have not been exposed to public health experience in any form. The health officer needs to correct the ideas of the Civil Service Commission and to help them understand that his nurses must have adequate fundamental undergraduate experience in these necessary fields, no matter what the state is willing to call them. In other words, the minimum standards of the National Organization for Public Health Nursing are basic requirements for good public health nursing in every state and there cannot be good public health nursing as long as Civil Service Commissions adopt anything less than these minimum standards.

It is most heartening to know that these N.O.P.H.N. minimum qualifications have been adopted by some Civil Service Commissions at the request of health officers, in fact, 33 per cent of the departments using these standards are official departments under civil service. Health officers will find helpful

material for this purpose on page 22 of Miss Randall's book already referred to. One health officer describes his experience in these words, "On last requisition a copy of the N.O.P.H.N. requirements was sent to civil service commissioner and requested that it be followed. It was." These health officers, real leaders, deserve the greatest admiration and praise of every public health nurse.

A word should be said concerning the personality and background of the public health nurse. It is certain that public health nursing is not promoted by the health officer who accepts inferior nurses and then finds it impossible to treat them with respect. Dr. John E. Gordon, Professor of Preventive Medicine and Epidemiology of the Medical School of Harvard University, has recently returned from Central Europe where he was directing special studies for the Rockefeller Foundation. In describing the nurses of the Balkans, he speaks of two kinds, those who dominated the field before the war and those since the war. He mentions the former as coming from the kind of homes which usually provide the maid service of any community and the latter as coming from the kind of homes which produce professional people. It is a very hopeful sign when a distinguished member of the American Public Health Association is aware of and sensitive to such far-reaching differences.

It is very encouraging to find that 40 per cent of health officers expect their nurse directors to spend some time in studying the qualifications of the nurses available, and that after discussing the facts with them the health officers employ the nurses in relation to the facts. Five health officers report political interference even though they are under civil service. One puts it "trying to tell me which one in three."

Of the 52 health departments only

28, or 54 per cent, have a nurse to direct the nursing program as a whole. That anybody can direct a public health nursing staff better than a well chosen public health nurse properly prepared for that responsibility is hardly worthy of our discussion. Public health nursing is a practical educational program which uses the content of the nursing course and the technics of public health nursing to put over health information and to teach the public. The person who can direct nurses best in the use of these tools for this purpose is a nurse who has been instructed in them.

There needs to be unity and oneness in purpose to make a service strong and conscious of its group responsibility and it is achieved best by a concentration of direction and leadership. The only person who promotes all phases of the nursing program without prejudice is the person who is not limited to any one part of it. That is the nursing staff director.

The health officer is entitled to the best prepared director of nurses that can be found. He should then lend an ear to all the progressive suggestions she presents for his understanding and support and actively to promote all that improves the quality of his nursing service. It would be fair to say that the health officer has not done the best for his service when he has engaged a director of nurses who has no progressive ideas to offer for his support.

It cannot be said that the salaries of directors, on the whole, stimulate nurses to pursue the necessary additional postgraduate education, because most of them are inadequate. Seventeen, or 60 per cent, of those departments having a nurse director give yearly salary figures. They range from \$1,800 to \$3,600, with one exception, \$6,500. Only 5 have a salary of \$3,000 or more, and 11 have less than \$2,800. The minimum qualifications for directors include a college degree as desirable edu-

cational preparation; graduation from a hospital school which has available 100 patients daily and experience which includes all the extra services listed above; at least one academic year in public health, theory and practice of supervision; 2 years of public health work under qualified supervision; several years' experience as a supervisor and if possible as an assistant director. She should have superior administrative ability and qualities of leadership. Also, in the interest of the department many demands which cost money are made upon the director and these make these poor salaries poorer because, while she cannot afford to finance them, as a director of nurses she cannot afford to miss them. In the light of these facts and the salaries quoted it does not appear that many health officers appreciate their responsibility to the head of their nursing service.

Regardless of the splendid public health preparation which some health officers require of nurses before giving them a position, supervision is still an essential. Each health department has its own particular policies, technics, rules and regulations, in which the nurses must be instructed. Constant improvement in department methods makes further changes necessary, and in every worth while occupation stimulation and inspiration must be given attention. The well prepared supervisor is the answer. Since her importance has become better appreciated and because supervision now includes several new services which have been added in recent years—nutrition, social diseases, mental hygiene, and others—the old accepted standard of 1 supervisor to each group of 10 nurses has proved to be inadequate. In view of this, it is disappointing to find that 67 per cent of the health officers are not able to report that they provide their nursing division with even this minimum, insufficient amount of supervision.

Two staffs of 60 and over have only 2 supervisors or 30 nurses apiece. Ten staffs ranging from 3 to 21 have no supervision whatever. These are not errors because while other salaries are given supervisors' salaries are not given.

Most administrators find that nurses on the whole make poor clerks and nurses accept this criticism. It is money wasted whenever a nurse's salary is used this way because clerical assistance should cost less and nurses should be doing the health work which otherwise will go undone. It may be easier to add nurses to the staff than it is to add clerks, but whatever the explanation it is obvious that most nursing staffs would do better and more nursing work if given enough clerical assistance to eliminate at least the routine clerical work. Especially is this true in clinics. Forty departments gave replies to this question. Two had no clerks whatever. Of those remaining, 45 per cent had 1 clerk for 10 nurses or less, and 15 per cent had the admirable record of 1 clerk to 5 nurses or less. That leaves 55 per cent that have 1 clerk for 10 nurses or over; 20 per cent of those are for 20 nurses or over. One staff has the rate of 1 to 120.

In regard to staff education, thoroughgoing programs of continuous staff education of college level are found only in 11 of the 51 cities answering and where these occur there is a full-time nurse director. Fifty per cent of the departments had no program of staff education in spite of the fact that the basic requirement in all of them is less than the acceptable minimum. Thirty-five per cent had some kind of program but there seems to be no planned program or definite objective in view. Where a certificate in public health nursing is the requirement for acceptance the need for continuous staff education may not be quite so urgent, but even here, with the constant growth and change which take place in the public health field, it

is a question of how long the certificated nurse can remain useful when no continuous staff education program is offered to her. Three departments have monthly or "occasional" lectures. Four have "the state's program" and it is to the credit of 5 that they have a continuous staff education of college grade. One health officer who has a staff of 29 certificated nurses but no nurse director says he has weekly conferences and "more not necessary."

A study of the salaries given shows no definite convictions on the part of health officers in regard to them. It would be expected that the range, regardless of the prevailing regional induction salary, should be, for similar work, the same the country over. We find even within the same state a difference in the salary range which varies from \$180 to \$899. Under civil service induction salaries vary from \$1,170 to \$2,100, and in departments not under civil service from \$1,200 to \$1,500. A few departments which have adopted the N.O.P.H.N. minimum standards offer only \$1,200, and a few departments which have no minimum standards offer an induction salary as high as \$1,840. One commissioner states "We hire nurses at the regular price when occasion demands," but he did not quote "the regular price." Only 23 per cent of the departments offer annual increases. An additional 17 per cent offer them at 3 or 5 year periods or have temporarily suspended them. Sixty per cent showed no increases or left the question unanswered. One health officer has raises every 6 months, a plan which has many advantages.

If a profession wishes to draw to it those best prepared to make a contribution, it would seem that there should be some relationship between the salary offered by it and the preparation which is offered by the applicant. There is very little of such relationship in official public health nursing. Of

the 35 departments under civil service, 17, or 49 per cent, left blank the question, "Is a higher salary offered to nurses who have special preparation?" Fifteen, or 43 per cent, answered "no" and only 3, or 5 per cent, "yes." One of these was qualified by the statement, "only with the permission of the mayor." Of the 17 not under civil services, 59 per cent did not answer, 29 per cent answered "no," and only 12 per cent answered "yes." So, regardless of the system, in less than 10 per cent of the departments have the salaries any relation to what the nurse can contribute. It is a pleasure to add that one commissioner said the idea "was approved" and another that it "was contemplated."

It is crediting nurses with more altruism than they possess to suppose that salary is not an important matter to them and that they are so eager to serve the community well that they will spend hundreds of dollars for additional education on which they expect no financial return. If it could be known that nurses who would obtain at least certificates in public health nursing would receive higher salary and recognition, more nurses would get them. Staff members would then know what they were doing immediately they started to work. At the present time, those who criticise the quality of public health nursing speak as though all employed public health nurses knew what they were doing. Of the 52 departments, only one demands that its nurses know public health nursing on acceptance. All the rest accept nurses with the minimum standards or less. So, strictly speaking, a just criticism of nurses' work is possible only in this one department.

There are some other less important points, discussion of which might prove helpful, but time does not permit it.

To summarize, some health officers are fulfilling their responsibility ad-

mirably in relation to the nursing program and some admirably only in some respects. There are ways however in which many others could help a great deal more: first, to realize that it is an impossibility to get the right kind of service from their staff unless every nurse on it has the right background, the right educational and professional education, the right kind and amount of public health nursing preparation, and the right content of health information. If these are all obtained before coming to the staff, so much the better; if not, it must be understood that the nurse will be on the staff a long time before she thoroughly masters her teaching job. Second, a nurse already prepared as a public health nurse should be paid according to what she brings to the department. She is a specialist and as in every other profession her additional education and experience should be recognized and compensated. Third, it must be remembered that nurses are human like everyone else. All the aids to sustain morale, like recognition for unusual service and increases in salary, and all those aids to improvement in work, like programs of continuous education and adequate direction and supervision, are indispensable.

It has been said that no division of nursing can rise above the level of performance set by its health officer and it should also be said that no division of nursing will get far without his active and understanding support. The quality of the public health nursing program in official agencies country-wide is, in the last analysis, in the hands of health officers; if it is to become grade A only they can decide.

REFERENCES

1. Randall, Marian G. *Personnel Policies in Public Health Nursing*. Macmillan Co., 1937.
2. Education Committee of the N.O.P.H.N., Minimum Qualifications for Those Appointed to Positions in Public Health Nursing. *Pub. Health Nurs.*, Mar., 1936. Reprints free of charge—N.O.P.H.N., 50 W. 50th St., New York, N. Y.
3. Scheffel and McGarvah. *Jurisprudence for Nurses*. Lakeside Publishing Company, New York, 1938, pp. 178-179.

Administrative Problems in a Delivery Nursing Service*

W. F. WALKER, DR.P.H., F.A.P.H.A., AND
E. P. BOWERMAN, M.D.

*Director, Division of Health Studies, The Commonwealth Fund,
New York, N. Y.; and Health Officer, Gibson County
Health Department, Trenton, Tenn.*

IN 1935 a study of obstetrical practices and facilities for maternity care was made under the auspices of the Gibson County, Tenn., Medical Society. Among other things, this study recommended that a delivery nursing service be organized as an adjunct to the existing public health program which had been carried on since 1922. The purpose of this paper is simply to indicate the administrative problems met in initiating and carrying on this service and how they were handled.

A WORD ABOUT GIBSON COUNTY

Gibson County, an essentially rural area, is in west Tennessee. It has a population of 49,000, of which 21 per cent are Negroes, and 23 per cent live in the three towns with populations ranging between 3,000 and 5,000. The county is moderately well to do for west Tennessee with an estimated per capita spendable money income of \$211 annually.

At the time of the study (1935) the personnel of the health department consisted of a health officer, an assistant

health officer, a supervising nurse, 5 staff nurses, a sanitary officer, and 2 clerks. The staff was giving due consideration to the acute communicable disease problem of the county, providing the usual services for infant, preschool and school hygiene, and, through special activities, making an attack upon both syphilis and tuberculosis. Due to the health officer's personal interest and training, possibly slightly greater emphasis was given to maternity hygiene service than otherwise would have obtained in the department prior to the organization of this formal service. The county health department, working in close coöperation with the local physicians, provided, in 1937, antepartum nursing supervision for 51 per cent of the mothers and instructive postpartum care for 52 per cent.

Gibson County is unique among rural southern counties with a large colored population, in that there are practically no midwives. Of the 800 births which occur annually, 93 per cent are delivered by physicians in the home, only 1 per cent occur in hospitals and about 6 per cent are attended by midwives, grandmothers, or convenient neighbor women.

The study of maternity care already referred to revealed that an appreciable

* Read at a Joint Session of the Health Officers and Public Health Nursing Sections of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 26, 1938.

number of maternal deaths, stillbirths, and infant deaths might have been prevented had the physician had the advantage of a trained person to assist him. For this reason, and to make the health department's service to the case continuous rather than interrupted at the most crucial time, the delivery nursing service was organized.

The county health department seemed to be the logical agency to provide this service since it was well thought of by the public and physicians and was already providing antepartum and postpartum nursing service to half the mothers.

REGULATIONS

It was early recognized that there would have to be very definite regulations governing the use of the service and that these must be understood and accepted by the local physicians in order to avoid misunderstanding and to reinforce rather than undermine previous teaching as to the value of antepartum and postpartum care.

The entire plan was, therefore, discussed at the regular meeting of the medical society by the health officer and the following principles worked out:

1. The service is available to all doctors practising in the county for patients living in the county.
2. Patients who receive the delivery service must have been under antepartum supervision for 4 months—except in case of emergency.
3. The service is provided for any case in the county in the event of a complication in which nursing assistance is necessary, regardless of the duration of the antepartum supervision.
4. Both patient and doctor must desire the service.
5. The doctor must not leave an obstetrical case for the nurse to watch while he attends to the rest of his practice. In general, the nurse accompanies or follows the doctor to the home. When he leaves, she leaves.

Experience has shown that the regulations are both necessary and sound. Success in their observance and general

acceptance by the profession was no doubt considerably augmented by extension teaching in obstetrics under the auspices of the State Medical Society as a part of its program of postgraduate education. This course of lectures, which laid particular emphasis upon antepartum care and asepsis, was given in the county just as the delivery nursing service was being launched.

Those familiar with the public health work in Gibson County were agreed that the generalized program already in existence should be continued and the delivery service added to it with as little change in emphasis in other fields as possible. This required additional nursing staff and equipment for the county health department. On the basis of $2\frac{1}{3}$ births a day, on the average in the county, and taking into consideration both uneven daily distribution and that the health department might well expect to assist in at least half of the cases, it was believed that a minimum of 2 nurses would have to be added to the existing field staff of 5. It was also recognized that not all deliveries would be given nursing service and that this additional staff would very likely be adequate for the case load which ultimately developed.

TRAINING OF PERSONNEL

Though the field nursing staff in the county was well trained, at the time none had had any special training in obstetrics. Arrangements were made for a special course for the supervisor and one staff nurse at the Chicago Lying-In Hospital. Approximately 1 month was spent in in-patient service acquainting them with modern obstetrics under the most favorable conditions and 2 months were spent on the home delivery service which offered many of the difficulties that would be encountered by the nurses in rural areas. Having in mind the routines and procedures which were current at the

Chicago Lying-In Hospital, the local staff, with aid from the state department of health and others, worked out routines which were adapted to local conditions and which experience has shown can be carried out satisfactorily in a rural community. These nursing technics were then taught to the remaining members of the staff by office demonstration using a large doll and subsequently through supervised deliveries.

EQUIPMENT

One of the recommendations of the maternity study was that the health department offer sterile equipment for the use of local physicians in home deliveries. A sterilizer was installed and a list of equipment and supplies was set up which the nurse would carry to the home. They included the items necessary for the conduct of normal labor, emergency equipment, and medications. The details of the sterile and other equipment which were carried with the costs are available on request. The sterile supplies required on every case were wrapped together and carried in a fiber case. The remaining equipment and medications are carried in a leather bag. This includes scrub-up material, intravenous set, sterile packing, tracheal catheter, records, and medications.

In setting up the list of sterile supplies due consideration was given to items which the mother would have available in the home and particular attention was given by the nursing staff to seeing that these materials were available well in advance.

It was intended that the physicians should provide all medications, but to meet emergencies which are bound to arise, caffeine, adrenalin, ergotrate, and pituitrin are carried. It was also intended that the doctors should carry, in addition to their own instruments, suture material, though experience has

shown that it is desirable to have sutures and needles available.

Before initiating the delivery nursing service, the antepartum and postpartum programs were altered slightly in order to insure better continuity with the partum service. Copies of these outlines of nursing procedures are available on request.

SCHEDULE

The most difficult problem to be handled in setting up a delivery nursing service is scheduling this activity to fit into other parts of the program. If the service is to be successful, a nurse must be available at all times, which means shifting the program from an 8 hour to a 24 hour base, and from a 5½ to a 7 day week. It was realized from the first that, if this service were to have any value in improving general community relationships and influencing other fields, it must be set up as a function of the generalized service with all of the staff nurses carrying delivery service at some time. Furthermore, if the load which was anticipated materialized, two nurses could not possibly carry it as a specialized service. Even when scheduled as a part of a generalized service two alternatives were open: (1) to have each nurse carry the deliveries in her own district, which would provide greater continuity of service but lead to some embarrassment to the regular program through interruption; or (2) to have one or two nurses on call each day and relieve them in whole or in part from their district responsibilities for the day on delivery duty. This latter plan was finally decided upon as it was felt that it would:

1. Promote unity of purpose in the nursing staff
2. Avoid wasted time in case no delivery was in progress as the nurse on second call could proceed with other phases of her program
3. Would, because the value of this service was easily apparent to the public, strengthen

the nurse's approach and contacts with the community

4. Would place a definite limit on the continuous hours of obstetrical duty and thereby lessen physical strain.

Under this plan, two nurses were always on call, one on first and one on second call. If we designate the 7 nurses as 1, 2, 3, 4, 5, 6, 7; nurse 1 on first call remains in the office during the day until a call is received. Nurse 2 on second call does field duty nursing until the first nurse 1 is called out. This is determined by periodic telephone calls to the office by second nurse 2. When nurse 1 is called out, nurse 2 returns to the office in order to be ready for a second case. At night (4:30 P.M. to 8:00 A.M.) both nurses must be within reach of the local telephone operator to whom they report each evening at the close of the office. The nurse on second call does not take a case unless the first nurse at the time is busy at another delivery. After a 24 hour tour of duty beginning at 4:30 P.M., nurse 1 goes off duty completely for 24 hours, nurse 2 becomes first call nurse, and nurse 3 becomes second call nurse, and so on.

In this instance there were 7 nurses to schedule and the tour of delivery service would have fallen on the same day each week if they proceeded in rotation. To avoid this each nurse was given 1 week without delivery service every 7 weeks. In case of sickness or vacation, the supervising nurse fills in for the staff nurse. Ten months' experience has proved that this schedule will work.

RELATIONS WITH PRIVATE PHYSICIANS

On the whole, the delivery service has been welcomed by the private physicians. It is a health department service of direct and tangible assistance to the physicians individually and collectively in their private practice. As might be expected, some are inclined to

view the service simply as nursing assistance furnished them and give little thought to the public health education which is essential to the best results. A few are inclined to criticise the requirement that cases be registered for medical and nursing antepartum supervision by the 5th month. While it is true that the doctors are frequently called to cases who have not been under antepartum supervision, and while nursing assistance would be desirable, the better men appreciate the long time advantage of this regulation. Experience thus far indicates that many more cases are reporting earlier for antepartum care than formerly and that the delivery service functions more smoothly in those cases who have had antepartum supervision and who have made suitable preparation for the baby's birth.

Some physicians have criticised the service because the nurse arrives too late. We are still of the opinion, however, that it would be both unwise and uneconomical to provide nursing care for a longer period than the physician is in attendance, as this would inevitably lead to situations in which the nurse would be forced to act as a midwife. The fact that the service can work almost perfectly so far as the doctor is concerned has been demonstrated by the physicians who have been the most extensive users of the service and who are in the main the best obstetricians. They, in general, determine the stage of labor before calling the nurse and are completely coöperative in their attitudes.

To determine with some definiteness the medical attitude, a brief letter and questionnaire were sent to the 43 physicians practising in the area. Of the 30 men who replied, only one expressed any doubt as to the worth-whileness of this service as a function of the health department. Yet, he admitted its advantages to him in his private practice.

Among the advantages which are cited were the following:

"It permits me to do a safer and better delivery. It makes a favorable impression on the patient to see me try to keep a sterile field. It encourages the patient to come in to the doctor earlier. It makes more of them come in for postpartum examinations."

"Makes possible early antepartum care; Kahn reports in early pregnancy; better able to educate the public to modern technic of delivery rather than blind deliveries under sheets; better aseptic conditions; nurses valuable in complicated deliveries."

And finally the physician who has probably used the service most and has the largest number of deliveries in the county:

"I have never before in my life or practice had the opportunity of using a nurse in delivery work and I have found it the best help to both me and my patients and I hope it will continue as long as I continue in practice."

These opinions of competent men are typical of the feeling of those doing the major obstetrical job.

Instances have occurred of unanimous endorsement of public health programs by physicians where they were paid a nominal fee for services rendered. It is gratifying to see that in this instance a service primarily designed to assist the doctor to render better obstetrical care without any personal compensation received wholehearted endorsement.

PRACTICAL DIFFICULTIES

We should like to mention a few practical difficulties encountered. The reaction of the nursing staff to this radical change of program presented a serious problem for a time. Weather and roads have had a considerable bearing upon this reaction, for, although Gibson County is a progressive and prosperous agricultural district, many of its roads are only graded dirt which in winter or rainy weather become a sea of mud making it impossible at times to reach

some homes by automobile. Insanitary and poorly heated homes add to the unpleasantness of the duty. These physical factors, the unusual routine of being on call, the occasional long periods of continuous duty, have frequently made a nurse wish that she were somewhere else where a delivery service was not a part of the program. This reaction on the part of the nurse was much more intense when the service was just begun than after 10 months' experience.

It is possible with the schedule as now arranged for a nurse to have 56 hours of continuous duty as an 8 hour day of field service always precedes 48 hours on call. Though this limit has never been reached, it has been approached on three occasions. This situation could, of course, be relieved by having a day of field duty intervene between the period of second and first call or by having the delivery service day begin in the morning instead of at night. It is felt by the staff, however, that this would add complexities to the schedule and that they would prefer to have consecutive delivery service and consecutive field time.

The schedule of field work has of necessity had to be adjusted to provide for the priority demands made by the delivery service. This has necessitated the planning much further in advance of clinics, community meetings, school examinations, and similar services. With the schedule of delivery duty planned for at least 3 months in advance, however, the difficulty in this field has been minimized. By actual count, the time devoted to field duty by the staff because of the days off is slightly less than before the service was inaugurated. It is still too early to draw any final conclusions as to whether or not this will seriously affect the program. It seems probable that even with the reduced number of visits, however, better relationships established in the home be-

cause of this service will increase the effectiveness of other visits made.

Because of the regulations set up requiring the registration of cases before the 5th month of pregnancy, except for people moving into the county and complicated cases, there has been some complaint on the part of physicians that the service does not reach all of the individuals needing it. Experience to date indicates that the service has been used most frequently by the more prosperous and better informed people and that no adequate means has thus far been found to bring the group with less initiative and forethought under supervision.

As is natural on a staff of this size, that desire for professional advancement, opportunities for more desirable positions, etc., lead to staff changes. This has necessitated careful selection of candidates for staff appointments to insure their willingness to undertake the service, and also a continued program of staff education.

SUMMARY

In the first 10 months the department attended 305 deliveries resulting in 293 live births, 12 stillbirths, no maternal life was lost, and but 5 infants died within the first month. The staff has devoted a total of 1,804

hours to this service, an average of 5 hours and 50 minutes per delivery, which includes staff nursing time, time spent by the supervisor devoted to staff training and answering of false calls. Fifty-three per cent of the calls were attended by the nurse on first call and 47 per cent by the nurse on second call. The staff has given 1,336 hours overtime service and has been allowed 2,024 hours extra time off in compensation—virtually time and a half for extra time service.

In the light of this experience it seems clear to us that:

1. A delivery service can be set up as a function of a county health department and have its work appreciated by the public and whole-heartedly endorsed by the physicians

2. Though the addition of such a service to a health department's program where there is a reasonably adequate nursing staff will influence to some degree time and emphasis placed upon other parts of the program, it has not, in this instance, in the opinion of the health officer and staff of the state health department, seriously interfered with the programs in other fields

3. Though the initiation of a delivery nursing service places a burden upon the public health nursing staff which they have heretofore been unaccustomed to, it is evident that the schedule can be so arranged as to work no undue hardship upon the staff or make the work so unattractive to the public health nursing profession that insuperable difficulty is found in finding suitable personnel.

DISCUSSION

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DRS. Walker and Bowerman have presented a very comprehensive discussion of the local administrative problems encountered in the planning and conduct of an obstetrical nursing delivery service. The program as outlined is of interest, not only from the standpoint of local considerations, but

also from it we hope to determine the most feasible procedures, if any, that may be utilized in setting up similar service elsewhere. It is particularly desirable that we be able to evaluate not only the results of this special activity in terms of public service and decreasing maternal morbidity and mor-

tality but that we give careful consideration to the possible ways in which the service may be extended to areas where the population and area per nurse is not so favorable as in Gibson County where each nurse is not required to be on first call more than once a week.

The question of a *special* versus a *generalized* service is also worthy of some consideration. Obviously it would not be possible for the small health department to plan a very definite program—even the department with a staff the size of the Gibson unit could not plan other work in advance unless there was some systematic method of scheduling assignments for this service. While it can truthfully be said that the program is carried on by the general nursing staff and that there is no apparent interference with the general nursing program, it is in reality a special nursing service to which each nurse of the staff of eight contributes a specified and periodic pro rata of time. We are not yet in position to chart a course

to be followed by the local departments with an admittedly inadequate nursing staff.

That the service is popular with the general public there is no doubt. The physicians utilizing it have only commendation for the assistance given. The skeptical and disturbed attitude of the nursing staff at the beginning of the program has been largely dissipated. There is some evidence that the work does appeal to a good percentage of the nurses just entering the public health field as well as to the more experienced group that had grown accustomed to daylight saving work hours only. The preliminary analysis of infant and maternal mortality indicates that the health and lives of mothers and babies are being conserved.

To say the least, we are digging for solid rock upon which our future program will be built. Perhaps we have already laid the foundation for the structure that is surely to come as a part of a hitherto unprovided service.

A Critical View of Nurses and Nursing Programs*

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PUBLIC health nursing may be defined as an organized community service rendered by specially and adequately prepared graduate nurses. It includes the interpretation, application, and teaching of hygienic, medical, nursing, and social procedures to promote health, to prevent disease, and to stimulate correction of defects or conditions affecting healthful living.

A clear concept of the status of public health nursing in the administration of public health and its relation to other aspects of the modern health program is essential to sound and effective performance.

Public health nursing plays a vital part in almost every activity of health agencies and requires expert public health nursing guidance.

Factors needed in the development of an effective public health nursing service are a compact administrative organization, adequately qualified personnel, clearly defined objectives, promotion of better service through public health supervision and consultations, and blending of the program with other health activities.

Public health nursing is necessarily a coöperative undertaking. Under

whatever auspices it may be organized, it must be developed with leadership of the medical profession and in close relationship to the work of teachers, social workers, institutions or agencies within the social, civic, and health fields, and particularly to official health activities and medical practice.

The health officer is recognized as the official leader in the health work of any community, responsible for the execution of a health program pertinent to local needs and one which meets accepted standards of public health practice coördinated with the state health program. The official public health nurse must act with his guidance and leadership.

It is essential for the medical director and the public health nurse to have a mutual understanding of policies pertaining to the objectives of the joint health service and its potential growth. He should delegate to her the responsibility for the development of the public health nursing details and technics. She in turn must keep him informed of public health nursing activities and consult him relative to the constructive development of her part of the program.

The wise health officer will expect the public health nurse to use initiative and will refer to her matters pertaining to public health nursing.

Careful consideration must be given

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the point where she in turn seeks the counsel of the health officer and abides by his decision. In other words, the public health nurse should never, in her desire to develop the general program, assume prerogatives belonging to the health officer. She may and frequently does by various methods influence his decision, but woe unto her if he interprets this as an intention to plan his program.

Sometimes in her zealous endeavor meticulously to perfect a program, she may acquire the habit of harping on petty difficulties which arise and which will often adjust themselves, at the same time missing the opportunity to encourage him by calling attention to constructive accomplishments.

The public health nurse must be informed and teach as she works, about personal, home, and community health, maternal and child health, nutrition and growth, communicable disease care and control, also social and mental attitudes and adjustments. She works with health officers, private practitioners, and personnel of agencies furnishing medical, civic, and social services. She also contributes indirectly to phases of sanitation, laboratory research, and vital statistics.

Field visits form an important item of the service. In the home as the public health nurse renders service, an opportunity is given to study the family as a whole in its environment, the purpose of the visit being threefold: to interpret and evaluate conditions relating to health problems, to render health service, and to stimulate health education.

By group instruction to various types of audience, the public health nurse multiplies her educational efforts, magnifies the importance of health, and popularizes health precepts. The public health nurse augments the quality of her work to the degree that she increases her teaching skill. She must be able and

desire to stimulate interest in public health. She must understand and employ principles of positive teaching. She must adapt materials to the limitation of the learner and speak in terms which will be understood and utilized. She must acquire the habit of teaching while rendering service, use the psychological moment to vitalize and drive home facts, and as indicated give a touch of drama to arouse interest. After initial instruction a competent teacher summarizes to bring out vital points; also in order to form a basis for future teaching, she evaluates what the individual or group received from the instruction given.

Methods of evaluation employed by the public health nurse include study and interpretation of growth in information, in skills, in development of interest, in improved health and living conditions, and in better understanding of patrons as to their share and responsibility in the development of individual, home, and community health.

A sympathetic understanding must exist between teacher and student with special effort on the part of the teacher to discover the interest and needs of the student.

A successful public health nurse cultivates habits of continued growth, attends and participates in staff conferences, seeks aid from advisory service, reads professional and other good literature and takes advantage of advanced university training. This leads to a better understanding of the relation of public health nursing to society at large and the part not only played by the nurse but by the people served.

As the public health nurse becomes expert she plies her art with increasing skill. She influences the thoughts and emotions of those she serves, she calms and stabilizes, she inspires and motivates. In turn she is sustained by the absorbing work so full of human comedy, tragedy, despondency, and

hope. She develops reserve power, orderly thinking, deliberative planning, and disciplined emotions. She cultivates tolerance toward approved current change in trends and technics, and by coördinated efforts fuses technical and professional services into family and community life. When she thus

integrates her work into the whole program her influence extends in ever-widening circles.

The test of the activities of the public health nurse is measured by the degree of acceptance and execution, on the part of the patrons, of her health teaching.

Possibilities and Means of Improving Dental Conditions in the United States^{*†}

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IMPROVING dental conditions in the United States I assume means preventing dental disorders in children with the hope that as they reach maturity they will have healthy mouths and sound teeth, functioning normally and with comfort, which they may retain throughout life. On this subject I present a dental educator's point of view.

Improving dental conditions in bygone centuries consisted chiefly in relieving pain. Sporadic attempts in restorative dental art are recorded. About 250 years ago mechanical procedures came into vogue and the esthetic phase also gained some recognition. Only the wealthy or royalty received attention.

Complications arose because of biological unknowns. Then, with the advancement of biological and physical science and progress in technical skill and art, dentistry came to be recognized as a profession. Still the emphasis was laid on restoration and replacement.

At the beginning of the present century, dental faculties considered bac-

teriology of enough importance to warrant its introduction into their curricula. Putrefaction was known but not fully understood until this science brought forth the explanation. Other sciences—pathology, physiology, anatomy, biochemistry, metallurgy, and chemistry—added their contributions to the changing course of study.

About 50 years ago the preventive aspects of dental service began to be discussed and programs were initiated, notably in Strassbourg, Germany, and in Rochester, N. Y. As related to school children in America, this means of improving dental conditions developed slowly until 1910 when it swept from east to west across the country like an epidemic.

In many places the dental schools took an active part in this movement. Besides their participation in the organization of school dental clinics and in making school surveys, the preparation of persons to render more and better service in preventive dentistry was undertaken. The first courses for the training of dental hygienists were organized by Dr. A. C. Fones, of Bridgeport, Conn., in 1913. The idea spread until there are now 19 institutions offering instruction in this field and 32 states have licensed these hygienists.

* Read at a Joint Session of the Child Hygiene and Public Health Education Sections and the Oral Health Group of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

† See also Editorial on page 375 of this issue for comments and varied opinions on this subject.

At first 1 year of high school constituted the admission requirement, followed by 1 year of professional training; a certificate was granted to those completing the course. Admission requirements were advanced gradually in some institutions to high school graduation, followed by 2 years of professional training, again leading to a certificate. Now in the University of California, 4 years of collegiate training are required for graduation and a degree of Bachelor of Science is granted. These trainees are health educators, supplementing in some instances their health education program with a prophylactic service.

Many dental hygienists are employed in private offices, where the educational program, if carried on at all, is individual. Office duties consist chiefly in periodic prophylactic service for adults, which has value in preventing the recurrence of dental disease. More can be accomplished in the prevention of dental disease by rendering prophylactic service to children at frequent intervals and they should be considered the most important group in the private practice clientele.

The health education programs which have been developed in the schools by dental hygienists have not accomplished all that was hoped, although some of them have been more efficacious than other types of programs. Hawaii is our best example of accomplishment.

Soon the possibilities of improving dental conditions in childhood through dental practice became evident to the dental educators, and dental students were all required to attend courses in children's dentistry. Didactic instruction was supplemented by clinical practice on children, and more recently technic courses in relation to the morphology of the temporary teeth and operative procedures have been required in the schools. Refresher courses for practising dentists, dealing with preventive dentistry especially for

children, have been set up by dental organizations and departments of health throughout the country.

Dentists in practice began to specialize in children's dentistry. A pedodontic society was organized, later becoming the American Society for the Promotion of Dentistry for Children. It now publishes a periodical.

One dental school offers an optional curriculum with emphasis on the prevention of dental disease. The students registered in this course are not required to complete courses involving the replacement of missing teeth during the last 3 years of the curriculum. By substituting orthodontics for prosthesis, they may qualify for graduation and receive the degree of Doctor of Dental Surgery. The major part of their clinical experience in college and subsequently in practice is with children and young adults.

So much for the history of the development of the educational phase of improving dental conditions. What about the present need for improving dental conditions, or more pointedly speaking, preventing dental disease?

The health education programs conducted by dental hygienists have in some localities proved to be very effective in stimulating interest in taking care of the teeth. But these programs do not cope with the problem of providing service for children with decayed teeth and other dental lesions. Without some sort of educational activity, the effective demand for dental service is very low, for several reasons: ignorance, fear, inconvenience, and costs. But when interest is aroused, service for children should be available.

Fairly reliable estimates indicate that there are about 30,700,000 children aged 2 to 14 years, inclusive, and about 12,000,000 more aged 15 to 19 years, inclusive, in the United States. Most of them are in school or college. This group of 42,700,000 represents

about one-third of our population. All of them need some kind of dental service every year. If each of these children received 4 hours' dental service on an average each year, it would require the services of 89,000 dentists working 40 hours a week for 48 weeks a year to care for them. Each dentist would care for about 500 children a year. There are about 71,000 dentists licensed to practise in the United States, of whom perhaps 65,000 are actively engaged in private practice.

If a program of service for children were put into effect, the adult population would have to be forgotten in so far as dentistry is concerned. Would the older patients yield to the children? I doubt it. And the possibility of securing service for all is not likely to improve, for the number of students attending dental schools is now much smaller than it was 10 years ago, so that as the older practitioners retire there will be fewer young men to replace them.

What about dental equipment? During the last score of years dental manufacturers have devoted their attention to the refinement and embellishment of dental equipment, materially adding to the cost until a single installation may cost from \$2,000 to \$5,000. A recent survey by the New York State Dental Society¹ states that the average cost of equipment is \$5,260.

One health officer I called upon in September, 1937, induced a group of dentists in his community to accept a plan whereby each would render a volunteer service, giving $\frac{1}{2}$ day each week in a central office. The dentists submitted for this a list of equipment and instruments which would cost \$5,000. He had \$600 in reserve to equip the dental office with used furniture and so advised them. Their reply was that they could not work in an office unless the equipment was up to the standard to which they were ac-

customed. The clinic was not started and the health officer was at a loss to understand the situation because he had equipped another clinic a few months earlier for \$450. A young dentist was rendering a satisfactory service there part-time at a moderate salary and at least some of the children were being cared for with mutual satisfaction.

I believe that a durable, comfortable, form-fitting pressed steel chair with a few attachments, such as a head rest, arms, and cuspidor, a pressed steel case for instruments, and a portable electrically driven dental engine could be produced in quantity lots for \$100 a set, allowing a generous margin for profit to the manufacturer and I believe that within a decade 100,000 of such outfits could be placed in cubicles in health centers or in school buildings to facilitate rendering the service the children require. The nurse and physician could find good use for this equipment, too.

All over the country health departments and schools are confronted with the problem of providing some type of dental care for underprivileged children. This, at present, is not accepted as a responsibility by governmental units, because it is looked upon as a phase of medical care; yet in thousands of communities all over the land dental service is being rendered through these channels where the official group is aided financially and socially by such volunteer organizations as Parent-Teachers Associations, Service Clubs, etc. One of the difficulties confronting these groups is the high cost of dental equipment. If the dental manufacturers are not interested in this problem, undoubtedly others will be in the near future.

The last phase of this question on the possibilities and means of improving the dental conditions of children in this country, and which I shall present from the educator's point of view, is the

problem of service. You all know the need for it and realize the inadequacy of what is offered at present, especially in so far as the underprivileged child is concerned.

When in Edinburgh 12 years ago I visited the Queen's Nurses Home, a headquarters office from which a group of noble women are sent to care for the needy in all sections of that city. There, I learned that these nurses were trained during a 2 year course of study to attend the expectant mother during confinement, as well as to give prenatal and postnatal care. By such a procedure the practice of midwifery was gradually being undertaken by qualified, well trained nurses who cared for the poor.

In Maryland in 1937, I learned from Dr. J. Mason Knox that a similar plan had been in effect there for several years, under the jurisdiction of the Division of Maternal and Child Hygiene of the State Department of Health. If the physicians in the locality where a pregnant woman resided declared to the Health Department that they would not confine the patient, then the patient had the choice of a midwife, who must be paid by her, or a public health nurse, whose salary was paid by the state. If the midwife was called, the nurse made it her business to be present to see that the midwife complied with the state regulations governing the procedure at delivery. I believe that you will all agree with me that such an operation is far more serious for the patient than cleaning teeth, filling small cavities, and extracting temporary teeth.

Does it not seem possible to you that we should be able to train persons to do these simple operations for children in 2 years time? One phase of this service is now being rendered by dental hygienists with only 1 year of training in some states and the results have been good. \

If such operators were given 2 years' dental training based on 2 years of pre-dental study, licensed to perform a limited service, and were placed under the supervision of licensed dentists who would counsel and direct them as physicians now counsel public health nurses, would it not be a desirable way of attacking this stupendous problem of dental care for deserving children? Provision could be made in our educational institutions, if they are willing to accept the responsibility, to continue the education of such workers, should they desire it, to the point where they might be awarded dental degrees.

The dental profession probably will not accept this program. Many schools will not endorse it. But in my judgment it is a very logical and economic way of solving the problem of dental care for the underprivileged children in our land. Thousands of young men and women could find employment under such a plan, rendering a needed service to worthy children, earning a compensation equal to that paid to others of like qualifications and skill. And, in due time, the children for whom they care will enter the self-sustaining group in a much healthier state than is the case at present. They will be more appreciative of and presumably better able to pay for their needs, including medical and dental care in later life.

The problem with which we are really concerned is the prevention of dental disease and dento-facial deformities. Health education, adequate nutrition, personal hygiene, eradication of infection, correction of endocrine dysfunction, correction of inherited defects—all contribute to the desired end. Of these I believe that nutrition, personal hygiene, and health education are the most important, for no program in preventive dentistry thus far inaugurated has been successful without these. We cannot, however, rely on any one or all of these to the exclusion of indi-

vidual dental care. This must be recognized as perhaps the major factor for some time to come. Dental attention must be given to the mother during the prenatal period and during the infancy of the child, and to the child itself from 2 to 21 years if we expect to attain our goal.

Why, in the United States where dentistry is universally conceded to be the best in the world, is there no lessening of the prevalence of dental decay, especially among children?

REFERENCE

1. Excerpts from Economic Committee's Report. *J.A.D.A.*, 25:1705 (Oct.), 1938.

Medical Students

"... They naturally have faith in their instructors, turning to them for truth, and taking what they may choose to give them; babes in knowledge, not yet able to tell the breast from the

bottle, pumping away for the milk of truth at all that offers, were it nothing better than a Professor's shrivelled forefinger."—Oliver Wendell Holmes, *Medical Essays*, 1855.

How To Improve Dental Conditions in the United States*

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THIS discussion was organized to consider specific suggestions for improving the dental health of the nation. The writer has three steps to propose.

The first proposal is an appreciable expansion of the present program of public dental health education through the agencies of the dental and public health professions, acting under both governmental and private auspices. There is probably no disagreement as to the desirability of this step. The rank and file of the American people do not yet understand that—with some latitude for individual differences—parents can insure good teeth to their children through the three-point program of adequate nutrition, suitable oral hygiene, and regular dental care.

The organization and methodology of such a program, using visual material, the spoken word, and the written word, is a subject inappropriate for discussion at this meeting. The proposal is for a national dental health education committee, representing all of the interested organized groups. Such a committee would secure agreement upon the fundamental coördination of par-

ticipating agencies and the expansion of a program to the point where increased national attention would be secured.

Second, schools can further improve their teaching of both oral hygiene and nutrition—particularly the latter. A tremendous improvement is possible in securing regular dental attention for pupils.

In Malden, Mass., we have raised the percentage of elementary school children having all necessary dental work completed each year from 30 per cent in 1927, to 71 per cent in 1937, without any increase in the amount of free dental service. This effective health education is developed in coöperation with the local dental profession. The private dentist or clinic dentist signs a certificate for each pupil when all necessary dental work has been completed. Each teacher and her pupils try to get as many members of the class as possible to secure all necessary dental attention before the end of the school year.

This proposal uses health education with home attention and dental coöperation instead of unlimited free dental service. It operates upon the philosophy that regular dental care is desirable and that children should be educated to secure such service upon their own

* Read at a Joint Session of the Child Hygiene and Public Health Education Sections and the Oral Health Group of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

initiative and at their own expense unless prevented by poverty.

The third proposal is the development and use of standards for measuring the dental health of school children in order that a school or a town can observe its own progress from year to year and compare its dental health status with that of other communities. Possible standards for comparable purposes include:

1. The number of children having all necessary dental work completed during the school year

2. The number of cavities filled per 100 children in the completion of this work (This information can be secured from the dentist if space is provided for it on the dental certificate)

3. The number of lost six-year molars at each age level.

4. The number of perfect six-year molars at each age level

5. The percentage of children at each age having four perfect first molars

You will recall that the American Child Health Association found that the six-year molar serves as a very good index of the dental health of the child population. In a recent study of 600 children in our 6th and 7th grades, we found that 98 per cent of the lost permanent teeth were six-year molars.

Dr. Wisan has proposed a lost permanent tooth index which shows the number of permanent teeth lost or needing extraction per 100 children and the percentage of children who have lost one or more permanent teeth. Our experience in having two dentists examine the same group of 184 7th grade children shows a very wide divergence in judgment as to the number of teeth needing extraction (59 per cent agreement for all permanent teeth and 68 per cent agreement for six-year molars).

It shows a much higher degree of consistency in reports upon the number of lost six-year molars (89 per cent agreement).

One might at first think that the number of cavities and the number of fillings in the six-year molars might provide a good index of dental health and that the ratio between these two figures would reflect the adequacy of the dental service secured by the pupils. The wide disagreement between dentists examining the same children in these respects indicates, however, that these measurements probably cannot be used.

This is not the place to develop a detailed discussion of the possibilities and difficulties encountered in securing a satisfactory index of dental health. It is certain that an objective and accepted index would have tremendous value in motivating the dental health education program in the public schools. It is also probable that a satisfactory index can be found. Rapid progress could be made if such a group as the National Dental Health Education Committee proposed above, or a committee appointed by some suitable professional association or official agency, would undertake to bring together existing information, to carry out such additional studies as may be necessary, and thus to evolve and present an objective standard.

In summary, the writer has proposed: (1) extension of our present public health education program in dental hygiene, (2) extension of the school health education program in dental hygiene with emphasis upon dental attention and coöperation with private dentists, and (3) the development of nationally accepted and objective standards of dental health.

Selection and Training of Dental Health Personnel*

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IN order to provide a background for this discussion of dental health personnel, it will be necessary to review briefly the history of the organization of public dental health services.¹ Twenty-four years ago Dr. Alfred Fones trained some women to clean teeth and later placed ten of them in the Bridgeport, Conn., schools to clean and inspect the teeth of the children and provide a measure of dental health education. Twenty years ago, the State Health Department of North Carolina employed a few dentists to examine and treat the teeth of school children. This was the initiation of dental health service in city and state departments and came fifty years after the formation of the first state health department. From this you will note that with the possible exception of industrial hygiene, dental hygiene is the youngest specialty of public health work.

According to *Public Health Bulletin No. 227*, 14 state departments of health and 2 state departments of education, in 1933, employed personnel to conduct dental programs. This personnel consisted of 60 dentists, 14 hygienists, and 2 teachers. A majority of the dentists

were part-time and all but 8 were occupied with clinical work. All but one of the hygienists were employed full-time and most of their time was spent in cleaning the teeth of school children.

In commenting on the organization of these dental services, *Bulletin No. 227* states that methods of operation varied widely in all 14 units. In most of these departments, the dental activities were carried on as a part of the Division of Maternal and Child Health; a few were separate bureaus directly under the health officer.

The funds made available by the passage of the Social Security Act stimulated tremendously the development of dental health services, particularly in state health departments. By the end of 1937, 33 states had organized dental health units in these departments. Twelve were separate bureaus directly under the state health officer, the remainder were subdivisions of other bureaus—chiefly, the bureau or division of maternal and child health.

In these 33 states, there were 40 dentists devoting their time to administration and organization—an increase of 32 or four times the number in 4 years. There were 94 dentists employed for field work, over half of whom were full-time. There were also 34 full-time hygienists, 6 teachers, and 7 nurses.

* Read at a Joint Session of the Child Hygiene and Public Health Education Sections and the Oral Health Group of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

Recent surveys in 93 cities of over 100,000 population show a total of 397 full-time and part-time dentists employed by either the health department or public schools; 15 of these devote their time to administration, organization, and education; the remaining 382 are clinicians. Employed also in the health or educational departments of these cities are 172 dental hygienists and 15 nurses—all employed full-time. All together, there were 768 people employed either full-time or part-time in 33 states and 93 cities to promote dental health. This, of course, does not account for the large number of dental personnel employed by counties and cities with less than 100,000 population and by private agencies. Indications are this number will exceed the total in the states and cities surveyed.

While funds provided by the Social Security Act stimulated a rapid increase in dental health personnel, yet the organizations directly affected took little concerted action regarding the type or qualifications of dental personnel until this year.

Any discussion of the qualifications of different types of dental personnel is directly related to broad objectives of the dental health program. There is general agreement that these objectives consist of—(1) the control of dental defects in their incipency, (2) an educational program to motivate the younger age group to have defects corrected early and periodically, (3) education for the promotion of better nutrition and hygienic habits, (4) provision for the correction of dental defects of those unable to afford it.

A study of the basic professional

TABLE I

Dental Personnel in State and City Health and Education Departments in 33 States and 93 Cities with Over 100,000 Population

Unit	Dentists Adminis- trative and Edu- cational (full-time)	Dentists Adminis- trative and Edu- cational (part-time)	Dentists Clinical (full-time)	Dentists Clinical (part-time)	Hygienists (full-time)	Teachers (full-time)	Nurses (full-time)	Total
33 States	40	3	55	39	34	6	7	184
93 Cities	5	10	144	238	172	..	15	584
Total	45	13	199	277	206	6	22	768

The purpose of presenting these data is to show you the rapidity with which public dental health services have been developed in the last few years and to impress you with the importance of the organization and training problems involved.

An analysis of available data^{2, 3, 4} shows that dentists, dental hygienists, teachers, and nurses have been selected for dental administrative and educational purposes, indicating a difference of opinion among public health officials as to the type of personnel best fitted to direct and promote the dental health program.

training of dentists and dental hygienists will show that they generally are equipped to promote only the clinical aspects of the program. A teacher is trained chiefly in the fundamentals of general education, with only a minimum of training in health education. Public health nursing courses are deficient in training in educational methods and dental hygiene. It is readily understood, therefore, that none of the personnel enumerated is qualified to administer and promote a well rounded dental health program, without additional graduate training and experience.

In addition to a distinct lack of

trained personnel in this field the solution of the problem of selection and retention of competent dental personnel is beset with the same vicissitudes as is the selection and retention of other health personnel. Pressure of political consideration and the demands of the dental associations in particular, have forced some health officers to appoint local personnel when better trained persons were available in other cities and states. Few states have civil service requirements, which is the best method of selection and retention so far devised.

It is recognized that the promotion of the dental health program may require the concerted efforts of the several different types of personnel mentioned. It would seem, however, that the logical person to administer the program in a health department is a dentist with general training in basic public health administration and special training and experience in health education and children's dentistry.

As previously stated, the present-day program is based largely upon the control of dental defects as early in life as possible and as often as necessary. This is to a large degree a professional dental service problem requiring orientation and training of practising dentists and the organization and supervision of adequate clinical facilities for those who cannot afford private service.

The problem of selling and educating the dental profession to provide competent dental treatment for children is one of the most difficult confronting the health department or school. To accomplish this special literature has been prepared, undergraduate schools of dentistry are being stimulated to improve courses in pedodontia, clinical courses and lectures are being promoted at dental meetings, and "refresher" courses for rural dentists are being conducted by health departments.

The rank and file of the dental profession is convinced that a dental pro-

gram, dependent as it is on increased and improved clinical service for children, should be directed by a dentist.⁵ In 1937 the House of Delegates of the American Dental Association passed a resolution requesting that directors of dental bureaus or divisions conducting state programs be licensed dentists. A number of state dental societies have passed similar resolutions.

It is obvious that for the time being, at least, the service side of the dental health program is the predominant one and that a great amount of assistance must come from the dental profession if it is to be successful. This would indicate that a dentist with graduate training in other necessary aspects of the general public health program is the logical person to administer and promote dental health in a health department.

Numerically, at least, the dental hygienist is the next in importance in the dental health field. Of the full-time personnel employed in this work the hygienists exceed in number all other combined. Primarily, the idea of the hygienist was conceived to provide the practising dentist with assistance comparable to that provided by the nurse for the physician. Her training was, and is largely today, pointed toward the cleaning of teeth, care and sterilization of instruments, and assisting the dentist with his operations. Almost from the beginning, however, schools and health departments, state and local, have employed hygienists to assist in the promotion of the dental health program.

There is considerable difference of opinion on the value of the dental hygienist in this field. Some contend there is no place for her in public health work, that the field is already overloaded with specialists, and that other than making individual dental examinations, there is little of value she can contribute that a school teacher, public

health nurse, or public health educator, cannot perform as well with some additional training. However that may be, it is quite obvious the dental hygienist must be trained to provide a service other than cleaning teeth and making dental inspections if she is to survive in public health work. So far, only one school offers a course for dental hygienists that will fit them for a public health career. There are only a few teachers devoting their entire time to dental health education. The few who have had graduate training in biology, physiology, general or dental hygiene, and other kindred subjects, are very helpful in the promotion of dental health education in the schools. Their schooling in the basic educational subjects fits them better than any other type of health personnel to organize and build dental health educational material and programs for school use. The teacher's entree in the schools is comparable to that of the dentist in the dental organizations. When it is understood that the success of the important school dental program is dependent upon the active coöperation and participation of dentists and school teachers, the importance of these individuals is readily understood.

The public health nurse is also a very vital factor in the promotion of a successful dental health service, especially among the important preschool group. The public health nurse is an important link between the home and the school and an important factor in the health program of the adult. Hers is a *personal* contact of recognized value in health education; a guiding hand from pregnancy to maturity. We must depend upon the public health nurse if we ever succeed in sending to school for the first time children free from dental defects. As in other public health fields, the dental health program is handicapped by the scarcity of trained public health nurses.

With some special training, the public health nurse can occupy an important place in the dental health program as a consultant to nurses in schools and in the field, in promoting school and preschool dental service. However, since the trend in public health nursing is toward general and away from specialized nursing, they can and should add dental hygiene to their training program. It is unfortunate that graduate courses in public health nursing have so little in them relating to dental hygiene.

I have enumerated the types of personnel at present employed to promote the dental program in health departments and described briefly the services they perform. I have tried to make it clear that few of them have had the specialized training necessary to fit them to perform these duties with a maximum of efficiency. It is true that by virtue of superior intelligence, hard work, study, and experience, a few have developed into efficient dental health workers. These, however, do not compensate for the large number recently employed who are handicapped in the performance of their duties by lack of adequate training.

The Public Health Service has urged in every instance that newly appointed, untrained dental personnel be sent for training in the fundamental subjects closely allied to their work. For some unknown reason, few health officials have taken advantage of the opportunity provided by the Social Security Act as far as training of dental personnel is concerned. Since the Act became effective, only 4 dentists have completed 8 month courses, 18 dentists were given short courses (16 of these in one state). A few dental hygienists and teachers have taken short 'summer courses in education to assist in preparing them for this work.

Arbitrarily we might say that any subject matter of a basic public health nature related to the special field of

dental health is essential to the preparation of dental health workers. At the April, 1938, conference of the State and Territorial Health Officers with the Surgeon General of the Public Health Service a schedule of standard qualifications was set up for public health dentists. The following is a summary of the minimum requirements adopted:

I. Basic educational requirements shall be:

- A. The degree of Doctor of Dental Surgery from a reputable dental school
- B. Not less than 3 years of clinical experience in the general practice of dentistry

II. Special qualifications:

- A. For dental officers of health of jurisdictions of less than 150,000, or those in subordinate positions in larger jurisdictions

1. Candidates for appointment shall be not more than 35 years of age. Preference shall be given to candidates in the following order—

- a. Those who have had training and experience in children's dentistry
- b. Those who have had one or more years experience in the general practice of dentistry

2. Personnel selected shall already have had or shall agree to take before assuming duty not less than the first semester course in a recognized school of public health

- B. For dental health officers of jurisdictions having populations of more than 150,000, for staff positions with state health departments, and for positions having the responsibility of supervisory and consultative service—the following standard of qualifications shall apply:

1. Not less than 1 year in residence at a recognized university school of public health and the satisfactory completion of a course of study in the following fundamental subjects in preventive medicine and dentistry: Biostatistics, Epidemiology, Health Administration, Sanitation, Communicable Diseases, Nutrition, Health Education, Dental Health Administration, Oral Manifestations of Communicable Diseases, and Children's Dentistry
2. Six weeks of field experience under proper supervision

III. Exceptions to the foregoing standards for dental officers may be made only when candidates for positions have, through experience and practical training, proved ability to perform successfully the duties of the position for which application is made.

All schools of public health accept dentists as students for both the short and full year courses. Harvard, Columbia, and Michigan, offer a full school year course in public health dentistry in addition to the required courses in fundamental public health subjects. These schools offer courses to dentists in Pedodontia, Oral Pathology and Oral Communicable Diseases, Health Education, and field work in Dental Public Health Practice. To the best of my knowledge, the University of California is the only school that offers a special course to dental hygienists intended to prepare them for public health work.

If teachers, nurses, and dental hygienists, are to be used in subordinate positions in the field, consideration should be given to their basic qualifications. The teacher does better work with the school health educational program; the public health nurse with the maternal, infant and preschool group; and the dental hygienist for dental inspections.

The following qualification standards are suggested to equip the individuals in these categories for field work dental health service:

1. Dental Hygienist—She should have an A.B. or B.S. in Education and have had a minimum of 1 academic year in a *special* oral hygiene course. (Special oral hygiene course, means a course in which a majority of the time now devoted to operative procedures is given over to a study of basic medical and dental subjects and to general hygiene.)

2. Public Health Nurse—A Registered Nurse with a certificate in public health nursing and a minimum of 1 academic year graduate training in health education or in a special oral hygiene course.

3. Teachers—An A.B. or B.S. in Education

and a minimum of one academic year graduate training in health education or special oral hygiene course.

It is hoped that the graduate training schools for nurses and teachers and public health educators will provide courses in dental hygiene. In certain localities, a few dental and public health schools offer graduate and postgraduate courses in subject matter pertinent to dental public health that may be taken by nurses and educators as optional subjects. Whether or not a teacher, public health nurse, or educator, expects to specialize in the dental health field, it is hoped these key people

will be offered courses in dental hygiene and allied subjects to prepare them better to assist in the program to reduce the high prevalence of dental defects.

REFERENCES

1. Salzmann, J. A. *Principles and Practice of Public Health Dentistry*. 1937, pp. 84-85. Stratford Co., Boston.
2. Cady, Dean, Messner. *Pub. Health Bull. No. 227*, 1936, p. 137. Government Printing Office.
3. Cleveland Child Health Association. *Survey of Mouth Health Programs* (3 Sections).
4. Report of the Economics Committee, *American Dental Association, on Dental Programs*, State Health Department, American Dental Association, 1938.
5. Report of Public Health Committee, American Dental Association, *Trans., 79th Ann. Session, 1937*, p. 299.

Immunization Against Tetanus with Alum-Precipitated Tetanus Toxoid

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IN the earlier papers by Bergey and Etris in 1933^{1,2} on the immunizing value of tetanus toxoid it was shown that the plain toxoid or anatoxin of Ramon³ was much too irritating for human use. Therefore they refined the plain toxoid by precipitating it with aluminum potassium sulphate and washing, a method similar to that of Wells, Graham, and Havens⁴ for diphtheria toxoid. They found that the resulting alum-precipitated toxoid stimulated the formation of tetanus antitoxin when injected into guinea pigs. The alum-precipitated toxoid used throughout these experiments was prepared from a toxin which contained 10,000 m.l.d. per cc. before detoxification.

Preliminary work was done by injecting guinea pigs at various intervals with 1 cc. doses of alum-precipitated toxoid. It was found that the serum of such guinea pigs receiving two injections given 90 days apart contained as much as 20 units of tetanus antitoxin per cc. Comparative tests made at the same time demonstrated the superior antigenic value of the alum-precipitated toxoid over the plain toxoid. The results of these experiments led to the following studies made on two groups of humans, youths and adults.

Thirty persons, between 18 and 20 years of age, volunteered for the first studies. Bleedings were taken before treatment and the serum tested for the presence of antitoxin[†]; however, none was demonstrated except traces possible within the limits of experimental error. An injection of 1 cc. of alum-precipitated tetanus toxoid was given and bleedings were taken 25 and 90 days later. The results showed that tetanus antitoxin is produced slowly after the first injection, reaching the maximum amount, 0.001 to 0.04 unit, in the 90 day period. The second injection was given 90 days after the first injection and tests after 30 days showed there was an increase of the antitoxin,⁵ from 0.1 to 9.0 units of antitoxin per cc. of serum. The first injection (primary stimulus), as shown in animals, seems to prepare the antibody-forming cells, so that subsequent injections are followed by a marked increase in the quantity of antitoxin in the blood.

In August, 1935, an older group of 44 individuals between 30 and 50 years of age was selected for study. The preliminary bleedings showed an absence of

* Died September 5, 1937 (see *A.J.P.H.*, Dec., 1937, p. 1205).

† We wish to express our appreciation and thanks to Russell Knerr and George Hottle of the Swiftwater Laboratories for their assistance, which involved a large amount of work, in testing the sera for antitoxin values. Their method of testing for small amounts of antitoxin was published in *J. Infect. Dis.*, 55:360-362, 1934. We are also greatly indebted to Dr. W. B. Rawlings for the toxin used in these studies.

antitoxin. Each member of the group was given 1 cc. of alum-precipitated toxoid and no local or systemic reactions occurred. A bleeding was taken 90 days later and the antitoxic value of the serum determined. The antitoxin ranged from 0.0005 unit to 0.01 unit per cc. of serum. Approximately 50 per cent of the individuals showed 0.0005–0.0008 unit of antitoxin. Three showed 0.01 and 23 showed 0.001–0.005 unit of antitoxin in 1 cc. of serum.

The amount of antitoxin contained in the serum after the first injection of toxoid is, however, no indication of the possible stimulation given by an additional injection of toxoid. A second injection of 1 cc. of alum-precipitated tetanus toxoid was given 90 days after the first injection, and a bleeding taken 105 days later, or an interval of $3\frac{1}{2}$ months after the second injection. The antitoxin content of the serum had increased 100 to 500 times its previous value and, with the exception of three sera which tested 0.03 unit, all contained 0.01–0.4 unit of antitoxin per cc. of serum.

A comparison of the results obtained by immunization of this older group from bleedings taken $3\frac{1}{2}$ months after the second injection, and those from bleedings of the younger group one year after the second injection, showed that the older group contained less antitoxin. In the lower age group not one serum showed less than 0.001 unit of antitoxin 90 days after the first injection, while about 50 per cent of the older group showed about 0.0005 unit.

Nineteen months after the second injection a second bleeding of the older group was taken and the serum tested as before. The antitoxin had decreased to approximately one-fifth of the former value and the serum of 14 of the 44 individuals now contained less than 0.01 unit of antitoxin. This amount is thought to be too low to

prevent the development of tetanus and such persons should have their immunity increased by giving an additional dose of toxoid.

There is difference of opinion as to the amount of antitoxin necessary to protect man from the development of clinical tetanus.

Sneath⁶ states "Of 29 persons given three doses of tetanus toxoid, significant amounts of antitoxin developed in 28, a titer of at least 0.1 unit per cubic centimeter of serum being reached in the majority, or 20. From 5 to 7 months after the last dose there was in general a reduction in the antitoxin level, but 27 still showed demonstrable antitoxin, the majority, 25, showing 0.01 unit or more."

Sneath⁷ also states: "In order to obtain an estimate of the relative protection afforded man by such levels of antitoxin, the blood antitoxin of 9 individuals, following the administration of the usual prophylactic dose of antitoxin (1,500 American units) was determined. Approximately 72 hours after intramuscular administration, the level was 0.1 or $> 0.1 < 0.25$."

Sacquepée⁸ states that from 0.1–0.2 unit of antitoxin per cc. of serum would probably be sufficient to give a considerable degree of immunity when one takes into consideration the sensitizing effect upon the cells concerned in the production of antitoxin.

From our own observations on the immunizing effect of toxoid we arbitrarily chose 0.01 unit of antitoxin per cc. of serum as the minimum protective level. In persons previously injected with multiple doses of toxoid, this amount of antitoxin can, in case of injury, be increased rapidly by giving an additional injection of tetanus toxoid.

Laboratory experiments have shown that the circulating antitoxin, as estimated by the mouse-protection test, does not represent the total protection. Immunized guinea pigs, showing 0.2

unit of antitoxin per cc. of serum, computed in terms of total humoral protection, will neutralize 6,000 m.l.d. of tetanus toxin. However, these pigs will tolerate an injection of 15,000 m.l.d. of tetanus toxin without showing any evidence of tetanus intoxication.

If we accept the difference between humoral protection and total protection as non-circulating or so-called cellular immunity, then the non-circulating immunity, at least in guinea pigs, is $1\frac{1}{2}$ times greater than the humoral protection which can be estimated by testing the blood after immunization.

Experiments by Rawlings⁹ have shown that guinea pigs immunized with 1 cc. of refined tetanus toxoid will tolerate injections of tetanus spores. Six weeks after the immunizing dose each pig was given a large dose of tetanus spores. The spore emulsion was prepared from an old agar culture which had been heated at 85° C. for 20 minutes to destroy bacillary forms and any existing toxin. Two grains of quinine sulphate was added to each dose as a necrotizing agent. The immunized pigs were all protected while the control pigs died within 5 to 9 days.

CONCLUSION

A comparison of the amounts of tetanus antitoxin found in persons of different age groups with refined tetanus

toxoid has shown that 90 days after the first injection the blood serum of older persons does not contain as much antitoxin as persons in the lower age group.

The second injection greatly stimulated the formation of antitoxin in both age groups but the average antitoxin titer was somewhat higher in the lower age group, and there also appears to be a greater loss of antitoxin from the blood stream in the older age group.

This investigation suggests that in immunizing older persons with tetanus toxoid it probably is necessary to give more than two doses of toxoid to develop a basic immunity.

Studies on the immunization of persons against tetanus are being continued with a refined toxoid prepared from a toxin having an original titer of 100,000 m.l.d. per cc.

REFERENCES

1. Bergey, D. H., and Etris, S. *Proc. Soc. Exper. Biol. & Med.*, 30:1037-1038, 1933.
2. Bergey, D. H., and Etris, S. *J. Infect. Dis.*, 53:331-336, 1933.
3. Ramon, G. *Ann. Inst. Pasteur*, 38:1, 1924; *Comp. rend. Acad. d. Sc.*, 178:1436, 1924.
4. Wells, Dewey M., Graham, Arthur H., and Havens, Leon C. *A.J.P.H.*, 22:648 (June), 1932.
5. Bergey, D. H., and Etris, S. *J. Immunol.*, 31:363-371, 1936.
6. Sneath, P. A. T. *J.A.M.A.*, 102:1228-1229 (Apr. 21), 1934.
7. Sneath, P. A. T. *Canad. Pub. Health J.*, 25:195, 1934.
8. Sacquepée, E. *Paris med.*, 23:491 (June 3), 1933.
9. Rawlings, W. B., V.M.D. (to be published).

Essential Problems in Pertussis*

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IF epidemiology is the servant of the health officer as well as a form of intellectual discipline and a field of science devoted to unravelling some of the phenomena of disease, we can properly review the present status of our knowledge or ignorance about pertussis to make sure that we are using our opportunities effectively to add to our facts and for the reduction of its incidence and death.

The fall in the reported death rate per 100,000 of total population, and in the case fatality per cent for pertussis in the past two decades in representative cities of the United States has been considerable:

DEATH AND CASE FATALITY RATES FROM
PERTUSSIS IN 32 CITIES OF THE
UNITED STATES *

	Average Death Rate per 100,000	Case Fatality Per cent
1924-1928	5.22	3.13
1929-1933	2.00	1.09

* Population at all ages in these cities was 21,904,758 in 1924, and 26,219,638 in 1933. The deaths numbered 5,820 in the first quinquennium and 2,469 in the second. The cases reported in the first quinquennium numbered 185,699 and in the second 224,606.

These apparent improvements in the situation seem to me to have been related more closely and consistently to a falling birth rate, and the resultant

effects on age grouping of the population, and upon the size of families, and upon the age at which the children are exposed to the disease, than to any specific factor in the private or public practice of medicine such as active or passive immunization of susceptibles, better treatment of the sick, or more effective isolation and other administrative measures directed toward the control of pertussis.

It would seem reasonable to expect that the case fatality of pertussis might have been favorably affected by the better home hygiene, antirachitic and other nutritional advances in the dietaries of children, more general and skilled home nursing of patients during isolation, and other factors which we see applied for the benefit of children under 5 years of age, but there are, I believe, no studies to confirm these general impressions.

ADMINISTRATIVE PRACTICES

If one were to note the features of current common administrative health practices which in some way hinder us from a more exact analysis of the downward trend of pertussis, one would note first that few if any health departments tabulate, if indeed they require the initial report card to include a record of, the age of the patient. Thus in attempting to study the trends in incidence and fatality rates which calls at least for age specific tabulations

* Read at a Joint Session of the Laboratory and Epidemiology Sections of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 25, 1938.

by years up to 5, and by 5 year groups up to 15 years of age, one finds practically no published data except perhaps from Providence, R. I., and in fact no records on file in health departments of cities from which case and death rates by necessary age groups can be calculated.

Second, one finds a very considerable incompleteness of reporting, the extent of which varies widely according to the interest and adequacy of the local health and medical services of the community, from approximate completeness to about 5 per cent of estimated cases.

Third, one finds that routine departmental procedure in establishing the diagnosis and recording the presumed susceptibility, exposure, and subsequent history of infection in households where other children than the reported patient are living, is neither uniform nor adequate to permit study of the relative merits of isolation periods of different lengths, of inoculations intended to prevent, or of therapy designed to modify the course of the disease.

It is the lack, it seems to me, of reasonably adequate, uniform, and effective recording and follow-up practices by health departments which has made it necessary to set up elaborate and very costly studies to learn whether what we are actually doing has any appreciable influence on incidence and deaths, and whether any immunizing procedures proposed by public authority or introduced in private practice by commercial promotion have any promise of good results.

The Sub-Committee on Whooping Cough of the Committee on Evaluation of Administrative Practices at its meeting last October made the following statement, and members of that sub-committee will give us some results of their studies since then.

The special study committee on whooping cough feels that there is a need for further

carefully collected data regarding the epidemiology of whooping cough, particularly the problems of early diagnosis and the recognition of mild and abortive cases, and would welcome information concerning such studies which are now under way or which are contemplated in the future.

The work planned by the special study committee on whooping cough for the ensuing year may be tabulated briefly as follows:

1. An analysis of Dr. Kendrick's immunization studies
2. A critical survey of the literature on the prophylactic use of whooping cough vaccine
3. An attempted evaluation of the pertussis immunization studies now in progress in the United States and Canada
4. A close coöperation with the committee on laboratory procedures in (a) a study of whooping cough antigens, and (b) an attempt to find methods which might, in part, be substituted for the present time consuming methods of testing the efficacy of pertussis vaccine as a prophylactic agent

This is not the occasion nor this audience the one for which warning of the severity of the disease, its direct and indirect damage to health, growth, resistance, particularly of young children, would be appropriate. We are aware of the leading rôle of pertussis among the acute communicable diseases of early childhood. What we know that will help us to control it can be briefly told, and what we must still search for and prove of greater worth is an open field for study.

The etiologic agent we know, also its source in the sick person, and how it is transmitted. The period of incubation is known with more certainty than the period of communicability, and yet the latter is fairly uniform and calculable. We assume, though without precise proof, that all persons are susceptible until they have had the disease, unless there be a spontaneous reduction in susceptibility with age after 15 years, and that active immunity of lifelong duration usually follows recovery from a clinically recognized attack. Several administrative procedures are in the stage of acute discussion, one, the use of plate cultures to establish or confirm

diagnosis, and to determine the end of the period of communicability; another, the use of vaccines for the prevention and treatment of pertussis; a third, the use of convalescent serum for passive protection of exposed young susceptibles and modification of the severity of an attack. It would be of great value if we had a specific test for immunity or susceptibility.

With regard to the use of the plate culture method, its usefulness and practicability as a public health laboratory procedure to aid diagnosis and to determine the end of the period of communicability, have been extensively tested in Denmark with satisfactory results. It has been used in a few cities in the United States but not as a routine, for any considerable period of time nor with practical results of any particular value. Its usefulness has been reported from San Francisco. The Danish and Harvard Whooping Cough Commissions found it reliable in skilled hands. It has not been recommended as a diagnostic test for routine field work by any representative public health organization in this country. It would seem that clinical criteria and white cell counts suffice for diagnosis without verification by plate culture, and that its routine use is too cumbersome and expensive to be justified as a basis for release of the patient from isolation.

Conflicting if not actually contradictory results of carefully controlled use of pertussis vaccines have been common. There are apparently factors related to preparation of the vaccine, to the size and number of doses, to the age and exposure environment of the children, and possibly to the type of the disease in the community or its prevalence during the period of test, any one of which may prove to be significant in the apparent success or failure of its use. There have been enough suggestive results in the hands of quali-

fied observers to encourage further experimental use under a variety of urban and rural conditions, and with vaccines or other possibly immunizing substances of different origins, and over a considerable period of time and number of susceptible children, to answer the uncertainties and inconsistencies of evidence received to date.

The use of convalescent serum and whole parental or convalescent blood has been limited to a few observers. Neither the extent of the use of these substances intended to create passive and temporary immunity, nor the reports of results, have been sufficient to justify recommendation of large scale or routine use of these agents to protect exposed susceptible children under the age of 5 years.

As to a promising test to determine presence or absence of natural or acquired immunity, it can be said that there is none.

If and when we have such a test of susceptibility for pertussis as we have for diphtheria, and if some of the active immunization procedures now undergoing thorough testing prove to be of substantial value we can look forward to their widespread encouragement and possibly their inclusion among the recommended procedures in local health practice.

In the meantime any health officer with even a modest administrative machinery can without any material addition to his record system cull valuable data as to any trends that may develop in different child age groups in regard to incidence, death, and case fatality rates. Also he can inform himself as to the probable extent of incompleteness in the reporting of pertussis by the practising physicians of his community.

I wish to add to my summary two paragraphs from the report of a symposium on pertussis held in San Francisco under the auspices of the Ameri-

can Academy of Pediatrics which I quote from the article by Professor Harold K. Faber.¹

There are, I believe, certain features of these institutional reports which offer clues to the solution of the problem under discussion today. First, it is obvious that the immunity supplied by prophylactic injection of *Hemophilus pertussis* vaccine is not, and cannot be expected to be, absolute. Second, contrary to earlier belief, the immunity derived from a previous attack of the disease itself is also far from absolute. Third, in both cases it tends to break down when exposure is intimate and prolonged. Fourth, under less drastic conditions of exposure both the artificially and the naturally induced immunity appear to afford protection in a large proportion of cases, and in general the protection from both sources appears to be approximately equal. Fifth, there is evidence of partial protection when the immunized individual does acquire the disease, as shown by briefer and milder symptoms.

It is clear, I think, from the evidence that I have reviewed that many problems need

further study. We need more field studies. We need a practical clinical test for immunity. Dosage may need revision, perhaps upward. The optimum intervals between injections may be greater than one week. We do not as yet know how long immunity lasts or the rate at which it declines. There may be strains of *Hemophilus pertussis*, such as the one which Bradford has recently noted, in about 5 per cent of cases, which should be included in the vaccine in order to increase the number of protected individuals.

The above appear to me to be at present the essential problems in pertussis, and with this introduction we can listen to the original contributions of the others on this program who are in the best position to answer some at least of the questions uppermost in our minds, such as those of Dr. J. J. Miller, Jr.

REFERENCE

1. Faber, H. K. *J. Pediat.*, 13, 2:279 (Aug.), 1938.

The Exhibit Medium*

HOMER N. CALVER, F.A.P.H.A.

Secretary, American Museum of Health, and Director, Health Exhibits, New York World's Fair, 1939, New York, N. Y.

MAN is constantly trying to break down the barrier which separates him from his fellows by endeavoring to improve his means of communication with them. None of the means so far devised is perfect. The first pictographs were an attempt to supplement the grunts and gestures which must have chiefly served primitive man to convey his simple ideas of food, shelter, mating, and combat with which his life was chiefly concerned. As life became more complex, so the auditory and visual symbols of expression assumed greater exactness, richness, and complexity. As a result the problem for the health educator today is to find a way to break through this welter of words written and spoken, pictures still and moving in black and white and color, fortified for their dissemination by powerful broadcasting stations, national hookups, Kleig lights, million-dollar stars, double features, and block bookings, not to mention high speed presses and mass circulation.

Although these media are also available to us to some extent the exhibit medium offers an effective and under certain circumstances a preferable method, for health education.

THE LANGUAGE OF EXHIBITS

Exhibits may be compared to language. Things exhibited are nouns.

* Read before the Public Health Education Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 25, 1938.

Color is an adjective; motion, the verb. Just as the selection and arrangement of our parts of speech determine the sureness with which we transmit an idea, so the selection and arrangement of our exhibit elements will determine the clarity and dramatic emphasis with which we tell our story through that medium. If I say to you the word "boy" this creates an image in your mind. If I say "black boy" the image takes on character. When I say "fat black boy" the image becomes still more specific. If this image is now put into motion with the words "fat black boy running" it becomes more interesting. So one adds adjectives, verbs, adverbs, and other words and phrases to the single concept "boy" to create a specific picture or arouse an emotion. Within certain limits this picture or emotion will be uniform for the whole audience. So, as one achieves lucidity and force of expression in language through adherence to the rules of composition one achieves similar results in exhibits through adherence to the rules of exhibit technic.

Our knowledge of these rules is still rudimentary, nevertheless there are some general principles which it is important to have in mind. First, it must be accepted that the exhibit medium in spite of its many values has certain distinct limitations. The exhibit as we know it today is not usually adapted to telling a comprehensive and detailed story. It can.

however, point out and drive home a few salient facts. In any one exhibit these facts should be limited in number and be related, because unity is a principle to be followed in any method of idea communication. The excellence of an exhibit is frequently determined by what is left out rather than by what goes into it. Exhibits also can well make use of the teaching principle of proceeding from the known to the unknown. Similarly simple ideas will be grasped more clearly by more people than complex ideas will be. In this connection it is well to remember that an idea which seems simple to the expert may be incomprehensible to the average man. Such an idea for instance as an adjusted death rate though elementary to the vital statistician is not understood by the layman or for that matter by many health workers or physicians. One of the first steps therefore in planning an exhibit is to form a clear concept of the audience to be reached. Many a candidate has lost the farmers vote because he talked in language which only the city bred could understand. It is obviously more difficult to make an exhibit for a group which is diverse as to education, culture, occupation, and age level than it is to make one for a homogeneous group such as a class of farm-bred school children. It should be noted, however, that the exhibit may by its manner of presentation automatically select from a miscellaneous audience the particular group it is desired to impress.

Having the group clearly in mind, the next step is to be sure one is certain of the purpose of the exhibit. Too often exhibits occur merely because some energetic soul has said, "Let's have an exhibit." When an audience is to be assembled as for instance in a convention, county fair, or town meeting, and it is desired to implant in the minds of that audience a few simple

ideas, then one should consider the exhibit as a most useful tool. Only under unusual circumstances such as a World's Fair should one depend on assembling an audience for the single purpose of looking at an exhibit, or attempt to use the exhibit as the sole instrument of education, particularly where the message is of necessity complicated or lengthy. Being aware then of the occasion and circumstances of the showing and having in mind the audience to be reached, the next step is to put down on paper for your own guidance and the guidance of those with whom you will collaborate, the purpose of the exhibit. For instance, "The purpose of this exhibit is to convince my Board of Directors, particularly that skeptical and wealthy Mrs. Jones, that we are spending our present budget very economically and that we should have twice as much money next year to meet our responsibility"; or "The purpose of this exhibit is to induce the farm mothers to bring their babies into town for the free clinic on Thursday mornings."

Setting down the purpose in black and white aids immeasurably in selecting the facts for presentation. Taking the last statement as an example, these facts might be:

1. The clinic is held in the basement of the Court House Annex. (There is no need to tell them in the exhibit how to get there or where to park their cars.)
2. The clinic is held every Thursday morning. (No need to say why it has to be held on Thursday mornings or that next spring it may be changed to Wednesday afternoons.)
3. That services are free and confidential.
4. That a regular check-up of a healthy baby may save expensive doctor bills (or some other one argument that has proved to be most generally appealing).

So far the task seems obvious. It is so logical in fact that I would not have dwelt on it except that I have noticed during an intensive experience with several hundred people who were connected with exhibit planning that

the usual tendency is to begin the other way around. Even before the story or purpose of the exhibit is decided on there seems to be an irresistible temptation to proceed at once to elaborate on or adapt this or that device or attention-getting gadget that has been observed somewhere else. This procedure is like writing the prescription before the diagnosis is made. It is comparable to taking a pill for a stomach ache without finding out what causes the stomach ache. One should guard against this patent medicine method of exhibit planning. Not until purpose and story have been determined is it time to design the exhibit. At this point it is desirable to seek help, employing an exhibit designer if possible. For a large exhibit such design service is essential if funds are to be spent most economically.

It is to be remembered that the exhibit is a distinct medium for the communication of ideas. It may draw on other media such as language and pictures, but if one depends on these aids chiefly it is a confession of failure. An exhibit is not merely an opportunity to show motion pictures or lantern slides to an audience which is standing up instead of sitting down. Though it may utilize charts and text it is not a magnified vertical textbook. An exhibit to be effective must have its own interest qualities, of design, color, movement, or a sense of motion. Among these, design is the most important. Design is to exhibits what rhetoric is to language. The problem of design covers the whole subject of the selection and arrangement of exhibit elements. In exhibit planning, design is unimportant as an end in itself. Design must be related to purpose. The selection and arrangement therefore of color, words, lettering, pictures, devices, light, and other elements should be determined by their relationship to the message of the exhibit and their value in achieving its purpose.

USE OF COLOR

Color is an inexpensive method of achieving effect. It can be secured by paint, ink, cloth, paper, or light. Color should be chosen for its psychological effect, not because someone thinks a certain color is pretty. Color can be used to produce contrast, harmony, emphasis, feeling, and a sense of motion. Juxtaposition of colors can produce striking results. There are few communities in which the health educator cannot find an artist or someone else trained in the use of color, who will be willing to advise him on this point. The local library can usually furnish a book or two on the subject. Among others, *The Study of Color* and *The Art of Color* by Michel Jacobs may be helpful.*

USE OF MOTION

Twenty-five years ago or more, our field was pleasantly stirred by Dr. C. St. Clair Drake, who as far as I know was the first person to introduce motion into health exhibits in this country. About the same time Dr. W. W. Peter employed moving health exhibits as well as many other ingenious devices in his mass health education program in China. The effect of this novelty on a hitherto motionless exhibit world was so startling that we still make a fetish of motion. Dr. Drake in fact maintained that motion was essential to attract attention even if it was nothing more than a flag fluttering in the breeze of an electric fan. Mr. Routzahn has since emphasized however that motion *per se* is not a criterion of effectiveness. He states that the motion must be related to the message. This is in accord with the principles of good functional design. Frequently design can impart a sense of motion and sometimes satisfactory results can be ob-

* Also *The Colorist*, by J. Arthur Hatt, and *Color Dimension*, by Faber Birren.

tained by merely suggesting impending motion such as a sledge hammer about to strike an egg.

LIGHT

Every exhibit should be clearly illuminated, and this nearly always means special lighting for the exhibit. In very few locations can one depend on daylight or the ordinary room lighting. Shadows should be avoided unless, of course, they are deliberately included for effect. Material with a shiny surface should not be used as the background of an exhibit since it produces glare and confusing reflections. Emphasis on a particular point in an exhibit can be secured with a spotlight. Silhouette lighting is very effective. In this method an exact silhouette, in reduced scale of the object to be illuminated, is placed in front of the spotlight so that the edges of the light coincide exactly with the edges of the figure or object. Flashing lights should be used with restraint. These as well as moving devices and other embellishments must not be so "clever" that the visitor is intrigued with their cleverness rather than the message of the exhibit itself.

LETTERING AND TEXT

The rules for lettering and text on exhibits are few and definite.

They are:

1. Keep the amount of text to a minimum. If the exhibit can tell its story with no text at all so much the better.
2. Use short words that everybody understands.
3. Use short lines with not more than 6 or 7 words to a line at most.
4. In a running text use upper and lower case letters. Words with all capitals should be used only for short titles or as an element in design.
5. Text should be large enough to be easily read at the distance from which the visitor is expected to view the exhibit.
6. Use plain Caslon or Futura letters for the message you want to convey. Gothic, Old English, script and other unusual type faces

can be used as an element in design or to produce a desired atmosphere.

VISITOR PARTICIPATION

Just as motion in exhibits has been emphasized in the past, so now the value of visitor participation in animating exhibits is stressed. I believe there is some psychological justification for emphasizing the value of such participation. Sometimes also it is cheaper to arrange for the visitor to animate the exhibit than to equip it with a motor. Common errors in the use of such devices are, however,

1. It is not clear to the visitor what he is supposed to do.
2. The machine is not designed to withstand a heavy visitor load or to prevent deliberate or unconscious abuse.
3. The visitor's interest is so centered on what he is doing that he fails to see or remember the rest of the exhibit.

As was noted under motion, the animation created by the visitor should implement the story which is being told.

TEN TYPICAL DEVICES

The most effective exhibit is one which is properly designed for its specific setting and purpose. There are, nevertheless, many stock devices some of which may be usefully incorporated under certain circumstances. Although some of these now seem trite from repeated use, they are still effective if skillfully employed. Here is a list of 10 such stock devices.

1. *The question and answer device*—This has been extensively used by the American Medical Association in many different forms. It is most useful where there are no other exhibits insistently demanding attention or when the visitor is not hurried.
2. *Moving lights*—These may take the form of a spot of light travelling a prescribed course, a line of light bulbs flashing, or a band of light growing longer and longer. This device is useful to show a route travelled, such as that of a train across the country, or a blood corpuscle through the body, or to carry the visitor's attention from one point of the exhibit to another.

3. *The pendulum*, of which the balance and the swinging pointer are variations—This device can show relationship, comparison or relative values.

4. *Big book with turning pages*—This has been popular with exhibitors but is not always popular with the audiences. Most people would rather read a book sitting down and turn the pages for themselves when they are ready.

5. *Moving signs*—Useful when the location is such that the audience is likely to remain to look at them as in a railroad station. Often, however, moving signs are resorted to simply because the exhibitor is unwilling to reduce text matter and make desirable curtailments in the story.

6. *The Peep Show*—A box or other device into which only one person can look at a time. This is nearly always a sure-fire attraction and may be inexpensive. It is essential that the visitor be given something really interesting to look at and that he be not fooled lest the usefulness of the device be ruined for everyone.

7. *The diorama*—A good old standby since The Century of Progress, getting so common now that it is no longer effective unless very well made, well lighted and represents a scene which is interesting in itself particularly when in competition with other dioramas.

8. *The short motion picture or "quickie"*—Best used when visitor-operated and lasting not more than 30 seconds. Useful to highlight a process or incident. Pictures must have action and good photography.

9. *Enlargement*—A giant typewriter, adding machine, safety pin, flower, or blood corpuscle will attract attention—useful in emphasizing size, number and importance.

10. *Photo montage*—A collection of photographs usually highly enlarged, cut out and fitted together. Pictures must be selected with care, and fitted together with a skill which makes them seem to be assembled without plan. Useful in giving a feeling or general impression as for example, the moving photo montage used to introduce one of the popular news reels.

There are many other stock devices and anyone who is responsible for exhibit planning will find it useful to keep notes of those he sees together with his observations of their value in presenting different ideas.

Finally, it should be emphasized that the setting or surroundings of the exhibit are as important as the exhibit itself. If we have to use a room with windows,

this can be overcome by building a false wall extending from 1 or 2 feet above the floor to within 2 to 3 feet of the ceiling, thus giving an unbroken surface and cutting off confusing cross-lights. Rooms that present a discouraging vista can be broken up with screens. The distracting background of a gold filagree decoration or a wallpaper of intricate pattern can be blotted out with cloth or paper hangings. In general, everything possible should be done to avoid visual conflict between the exhibit and its surroundings, and visual conflict between different exhibits.

In conclusion, let me recommend that you try out your exhibit on a test audience before you present it to the public, and do this if possible before it is too late to make changes. Many of us are so engrossed in the subject matter of the exhibit that we fail to realize that signs, symbols, and words may have a different meaning and implication for us from what they have for the audience. Dr. Gebhard, who has had much experience in the field of medical exhibits, gives me the German word "*trugschluss*," which as near as I can translate it means false impression or misleading conclusion. After all our efforts we must be sure that our exhibit does not convey some other idea than the one we intended. For instance, at the Museum of Natural History in New York there is an exhibit which aims to show the value of inoculation against typhoid fever. The model represents soldiers in the Spanish American War which occurred before soldiers were inoculated. It shows that out of every 100 soldiers 14 were afflicted with typhoid for every one injured by gunfire. The reaction of an intelligent man who saw this exhibit recently was, "What safe wars they used to have."

In summary then I would list these points for the guidance of health educators who are creating exhibits:

1. Have your audience clearly in mind.
2. Set down the purpose of the exhibit.
3. Select a minimum number of salient points to be presented.
4. Make a design with whatever help you can secure.
5. Incorporate such exhibit technics as you may have observed to be effective and which lend themselves to the telling of *your* story.
6. Incorporate motion or visitor participation if circumstances warrant, funds permit, and these clearly pertain to your message.

7. Tell your story in terms your audience cannot misunderstand, but do not talk down to your audience.

8. Test your plan before presenting it.

9. Experiment a little, judging results by visitor reaction rather than by subjective satisfaction.

REFERENCE

Calver, Homer N. Exhibits for the Laity. *Journal of Technical Methods and Bulletin of the International Association of Medical Museums*, 18, 1938.

Epidemiology of Leptospirosis*

K. F. MEYER, M.D., Ph.D., F.A.P.H.A., B. STEWART-ANDERSON, AND B. EDDIE

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DURING the past 2 years the Epidemiological Intelligence Services of the West have repeatedly requested coöperation in the solution of the etiologic factors responsible for outbreaks or sporadic cases of jaundice. Epidemics involving small rural schools have occurred in May and June and affected as many as 42 children at one time. In another, the cases of catarrhal jaundice were seen in familial distribution shortly before or during the rainy season which was followed by floods.

Invariably, the serological examination, inoculations of guinea pigs, and the examination of rodents collected within the epidemic area yielded no evidence which would stigmatize the *Leptospira icterohaemorrhagiae* as the causative factor. In fact, a careful analysis of the clinical cases, the incubation time of from 3 to 4 weeks, and the obvious contagious character lead to the conclusion that these outbreaks were indistinguishable from the well known epidemic catarrhal or infective hepatic jaundice previously described by Blumer¹ and others for this country and well known in Great Britain through the publications by Pickles,²

Morgan and Brown,³ Findlay, Dunlop, and Brown,⁴ and in Syria by Yenikomshian and Dennis.⁵

Thus far, all experiments to reproduce this disease in a great variety of animals have furnished little tangible evidence concerning the etiologic agent. An ultramicroscopic agent transmissible to man only is suspected. Sporadic, abortive or latent cases may be the sources of the infection. On the other hand, it must be recognized that single cases of febrile jaundice may be typical cases of Weil's disease. Relatively little attention has been paid to these infections in the United States; in 1937, Packchianian⁶ places on record about 32 proved cases. More recently, 2 sporadic cases have been diagnosed in Rochester, N. Y.,⁷ several in Detroit, and at least 5 have been studied in San Francisco and vicinity. Examinations of serum specimens and sections of organs derived from guinea pigs injected with urine of patients have proved the existence of Weil's disease in the Hawaiian Islands.⁸ There is every reason to believe that these figures merely represent a small fraction of the actual cases.

Experience both in England, particularly London, and in Holland has shown that the incidence in proved diagnosis rapidly increases, provided reliable diagnostic methods are available. Thus,

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previous to 1933, less than 4 cases of Weil's disease were reported in London for an entire year. With facilities to test the sera of suspected cases at the disposal of the physicians, the same number of infections are now seen within a month. Since the first case of Weil's disease was diagnosed in 1924 in the Netherlands with the help of a bacteriological examination, not less than 756 cases had been detected by the end of 1936. In Rotterdam, the rate was 56 cases per 400,000 population. Likewise in France between 1924 and 1932, 263 cases were entered in the official records.

Furthermore, it is now recognized that only two-thirds of the patients infected with the leptospira show an icterus. The symptom of jaundice arouses suspicion to such an extent that an examination for leptospira is usually indicated. The relative ease with which a few of these infections have been recognized in California as soon as proper diagnostic methods were available encourages the belief that human leptospirosis may be masquerading under a diversity of diagnoses.

LABORATORY AIDS

The methods of bacteriological diagnosis are delicate and require considerable experience. It is well to remember that the parasites can be detected only in blood plasma specimens concentrated by centrifugation during the first 4 days of illness. Darkfield examinations are very misleading and have not infrequently tempted the examiners to make erroneous diagnoses. The inoculation of guinea pigs with the patients' blood again proves successful only during the early days of the illness, rarely after the 8th day. The animal test is not dependable since certain leptospira strains have a low pathogenicity even for very young guinea pigs. Perhaps, the use of deer-mice (*Peromyscus*) as suggested by

Packchianian or the Richardson squirrels as recommended by Syverton, Stiles, and Berry⁹ may improve the diagnostic yield. These procedures may be supplemented by cultures of the blood but they presuppose a close coöperation between the physician and the laboratory. Experience has shown that the serological tests—agglutination and lysis—followed by animal inoculations with urine or spinal fluid are the most dependable tools in epidemiological work.

The serologic technic developed by Schüffner¹⁰ using living and formalinized (pure formalin) antigens prepared from leptospira cultures in Verwoort media has proved highly satisfactory. With this procedure, the diagnosis of Weil's disease is greatly simplified provided several strains of leptospira are used as antigens, and that titers under 1:300 are not accepted as diagnostically decisive. Esseveld,¹¹ in a careful study on a large series of cases (87), stresses the fact that any titer above 1:300 usually > than 1:10,000 may be safely interpreted as undeniable proof of Weil's disease. In view of the difficulties inherent to these serological tests, it is advisable to centralize the examinations in state or research laboratories with trained personnel.

EPIDEMIOLOGIC OBSERVATIONS IN CALIFORNIA

Since 1927, at least 5 laborers connected with the cleaning and the maintenance of the sewers in San Francisco developed a febrile jaundice resembling Weil's disease. A definite serological diagnosis was made on one case in 1936 and on another in 1937. During the same year, a fatal Weil infection was recognized in a 61 year old Japanese who had worked in his rat infested garden, and an anamnestic diagnosis was made in a veterinarian who serves at the hospital of the Society for the Prevention of Cruelty to Animals and

handles a great many jaundiced dogs. In July, 1938, a filling station operator, aged 27, developed Weil's disease following a fishing trip along the Napa River. He also waded in the mud beds along the wharves and had eaten his lunch in the same area. At the same time, a 28 year old assistant to a veterinarian at Stockton, Calif., with an influenza-like febrile disease was diagnosed as an interesting case of Weil's disease due to *Leptospira canicola*. Investigation of this limited number of human leptospirosis disclosed the existence of two different sources of infection. Nine of the 11 cases had in one way or another been in contact¹ with water or sewage, while two were² exposed to dogs.

Since the degree of endemicity of Weil's disease is influenced by the murine infection of the rat population, the hydrogen ion concentration of the surface water, a low salinity and a hardness not exceeding 19 to 21, a number of preliminary surveys have been instituted.

With the assistance of the San Francisco Department of Public Health and the Laboratory for Plague Suppressive Measures of the U. S. Public Health Service, both random and spot sampling of 467 rats (*Mus norvegicus*, *Mus alexandrinus*, and *Mus rattus*) yielded in darkfield examinations renal leptospira findings in 176, or 35 per cent. In the vicinity of an animal stable, 42 of 44 old *Norvegicus* rats have been found infected. Single or pooled specimens of the rat kidneys on inoculation into guinea pigs produced the lesions typical for leptospirosis on the first, second, or third passage through these rodents. Twenty-three strains were isolated in culture and by serological tests identified as *Leptospira icterohaemorrhagiae*, generally known as the classical rat strain. Murine leptospirosis had been previously recognized by J. R. Ridlow in San Francisco. Renal leptospirosis infections have been definitely

established in Washington (10 per cent), Nashville (10 per cent), New York (17.2 to 21.9 per cent), Albany (40 per cent), Baltimore (7 per cent), Chicago (3 to 52 per cent), Rochester (38 per cent) and Detroit (16 per cent). The contaminations of water, soil, and food by the urine of these rodents and possibly mice, gophers, or other rodents furnish the seeds for the human infections. Since the intact epidermis is quite resistant to the penetration of the leptospira, the contaminated water must by necessity be brought in contact with the mucous membrane.

In the city with a continuous control of the rat population as a plague preventive measure, the exposures of man to the classical rat leptospira are limited to water accidents, contact with sewage or mud and soil in the vicinity of rodent harborages.

Although the serological tests of the rat strains thus far isolated identify the organisms as indistinguishable from the classical strain studied throughout the world, it is important to remember that other types, probably antigenic variants, may be encountered. The diagnosis of human leptospirosis must employ the serological tests reservedly; just as in typhoid fever the ultimate proof of clinical Weil's disease depends on the isolation of the causative spirochete.

CANINE LEPTOSPIROSIS

The blood serum of a veterinarian, who had an attack of undiagnosed malady complicated by icterus and nephritis 8 months before the test was made, agglutinated *Leptospira canicola* in a dilution of 1:300. More recently, this spirochete has been isolated from the urine of an assistant veterinarian, whose blood clumped and lysed the *Leptospira canicola* in a dilution of 1:10,000 (4+) and 1:30,000 (3+) and *Leptospira icterohaemorrhagiae*

1:100 (4+). In both cases, the epidemiological inquiries strongly incriminated the handling of dogs suffering from "yellow" or Stuttgart's disease. It may, therefore, be appropriate to review the essential facts which have been collected concerning these canine diseases during the past 2 years.

For some time, the hospital of the Society for the Prevention of Cruelty to Animals in San Francisco has noted a high mortality among dog patients suffering from jaundice or severe hemorrhagic gastroenteritis with or without icterus. At the request of Dr. S. T. Michael, 87 dogs, either dead or moribund, have been submitted for examination in order to determine the cause of the illness or death. The prominent autopsy lesions classed the dogs into two types—hemorrhagic and icteric. The former, seen in 38 dogs, resembles Stuttgart's disease or canine typhus, while the latter noted in 42 animals is indistinguishable from "yellows" or canine jaundice. Seven dogs had passed through both types, death occurring while they were in the icteric stage.

Since the gross lesions are in every respect similar to those described by Okell, Dalling, and Pugh,¹² Wirth,¹³ Klarenbeek,¹⁴ and others, and since they will be detailed elsewhere, suffice it to record that leptospira have been demonstrated in the organs of the cadavers of both types in darkfield preparations and properly stained sections prepared from the kidneys, occasionally spleen and liver.

The isolation of these spirochetes offered many difficulties but to date 11 cultures have been obtained from California dogs. Nine were secured directly by culturing the blood from 2 days to a few hours before death or from the clotted blood at the time of autopsy. In two instances, the strains were cultured from the peritoneal fluid or heart blood of very young guinea pigs injected with the emulsion of kidneys

of infected dogs. Failure to culture the leptospira is largely attributable to the heavy bacterial contaminations of the tissues secured from the moribund dogs, and the low pathogenicity of the organisms for guinea pigs. Repeated passages through these rodents are required to induce fatal infections; as a rule, hemorrhages on the viscera and the lungs are noted and a general icterus is very rare.

The isolated leptospira strains are serologically identical with *Leptospira canicola* recognized by Klarenbeek and Schüffner in 1934 in Holland as a specific spirochete of the dog. The independent position of this leptospira has been fully established by Walch-Sorgdrager and Schüffner,¹⁵ who kindly identified the California strains. *Leptospira canicola* is widely distributed and has been found, aside from Holland, in Germany, Austria, and Denmark. Since it has never been isolated from rats, it is generally recognized that this rodent plays no rôle in the dissemination of Canicola infections.

Canine leptospirosis affects all breeds of dog, but rarely under 1 year of age. In California, the highest incidence is noted during the summer with the peak in July and August. The mortality is generally considered high, although accurate figures are not available. In San Francisco, the hospital furnishing the dogs estimates the losses at 80 to 90 per cent. Annually, approximately 150 cases are brought to the clinic for treatment. Fatal infections have been prominent among males; the ratio of the dogs autopsied and sex noted in the histories was males: females 67:18. According to the statistics of Kok in Holland, male dogs are three times more frequently infected than females.

Since it has been impossible to judge the incidence of canine leptospirosis, in particular the Canicola infection in San Francisco and Northern California, a series of serological tests have been un-

dertaken. Of 47 normal dogs obtained from one source, 16 or, 34 per cent, gave serum reactions (1:100 to 1:300,000) indicative of a passed or sub-clinical leptospirosis infection. The dogs of a rural community showed a slightly lower percentage—14.3 per cent or 4 in 28 canines—of latent infections.

Through the courtesy of Dr. Norman J. Pyle of the Lederle Laboratories, Pearl River, New York, the blood sera of 111 dogs, comprising 13 different breeds ranging in age from 1 month to 12 years, were subjected to agglutination and lysis tests with leptospira strains. Ten dogs (9 per cent) agglutinated *Leptospira canicola* in dilutions 1:100 to 1:300,000, while 3, or 2.7 per cent, reacted with *Leptospira icterohaemorrhagiae*.

The existence of canine leptospirosis in the East had been suspected, but it is now proved that both types of leptospira may cause clinical and latent infections in a manner and distribution somewhat similar to that reported from Holland. The observations of Molner and Kasper¹⁶ in Detroit would indicate the existence of canine Weil's disease in the Middle West. As a rule, the Canicola infections overshadow those due to the classical strains. According to Klarenbeek, in 1937, 31 dogs reacted with the *Leptospira canicola* and 21 with the *Leptospira icterohaemorrhagiae* strains. Previous data indicate the following relationship: *Leptospira canicola*: *Leptospira icterohaemorrhagiae* 125:89. On the other hand, in a Danish village, Borg and Petersen and Jacobsen¹⁷ found the sera of 18 in a series of 53 dogs (33 per cent) to give serum reactions indicative of latent classical Weil's disease (*Leptospira icterohaemorrhagiae* serum titers 1:300 to 1:30,000). Only 1 dog of the series reacted with *Leptospira canicola*; he shed the specific spirochete in the urine. Thus 19 dogs, or nearly one-third of the dog population ex-

amined, suffered or had passed through leptospira infection.

The absence of classical strain infections among the canines of San Francisco and California is interesting, and may in some way be associated with the rodent control measures which prevent the hunting of rats by dogs.

The incidence of latent infections increases with age. In dogs over 6 years of age, nearly 60 per cent show the residuals of a latent infection (Kok). The California Canicola leptospirosis is complicated by icterus, and in this respect differs from that seen in Holland. The renal lesions are, however, remarkably similar to those described by Dhont, Klarenbeek, Schüffner, and Voet.¹⁸ In fact, the nephritis, which may lead to acute or subacute fatal uremia, persists following recovery and forms the basis for a leptospiuria for several months.

It is this shedder stage with the *Leptospira canicola* which doubtless maintains the epidemization of the dog population in form of acute and fatal, atypical, abortive, and latent infections. Since the dog exhibits great interest for the urine and the genitalia of its own species, the infection is doubtless spread by contact directly through the tongue or nose. This behavior is preëminent among male dogs and thus explains the higher incidence. Sexual intercourse may equally be a factor. General uncleanliness may lead to the infection of an entire dog family and to clinical or latent human cases.

HUMAN "LEPTOSPIROSIS CANICOLARIS" OR CANICOLA FEVER

The two observations on Canicola fever in California may be classed with the occupational diseases. Both the veterinarian and, in the second case, an assistant in a dog pound handled a great many (about 150 annually) dogs suffering from leptospirosis. However, it is not unlikely that Canicola fever

is more widely prevalent than is indicated from the available records. Mild cases are difficult to diagnose and Canicola infections, without any icterus, prevalent among dogs may readily cause atypical or abortive cases in the owners (Roos, Walch-Sorgdrager and Schüffner).¹⁹

Without a special bacteriological examination, an influenza or undulant fever-like disease or a meningitis may be suspected as a Canicola infection provided the inquiry discloses an association with dogs. During the past 3 years, the diagnosis of Canicola fever has been established for 12 human beings living in Holland. At least 6 cases have been recognized in Denmark. Brammer, Petersen, and Scheel-Thomsen²⁰ traced the infection of a 25 year old housemaid with signs suggestive of undulant fever or miliary tuberculosis, but with a Canicola serum titer of 1:300, to a 7 month old puppy which lived in the house and suffered from an acute attack of nephritis. The persistent dysuria which followed forced the maid to mop up after the dog several times a day.

WEIL'S DISEASE TRANSMITTED FROM DOGS

Aside from the 20 cases of Canicola fever thus far reported from Holland, Denmark, and the United States, human Weil's disease caused by the classical strain transmitted from the dog to man have been reported. The two infections described by Krumbein and Frieling²¹ and one by Montagu Lawrence and Okell²² have not been proved bacteriologically. On the other hand, the fourth case seen by Borg and Petersen and Jacobsen in a plumber was traced to his pet dog, an 8 month old "Rattler Pinscher" with serum titer for the classical strain of 1:30,000 and positive findings of spirochetes in the urine. Two cases of Weil's disease in Detroit are doubtless of canine origin.

LATENT LEPTOSPIROSIS

In view of the widespread and regionally high incidence of murine and canine leptospirosis, it is reasonable to suspect that aberrant human infections due to water accidents, etc., and due to association with diseased subclinically infected dogs may be more frequently encountered than the present reports would indicate. The finding of leptospira antibodies by Mason²³ in the sera of 6 out of 11 rat catchers, none of whom recollected having been jaundiced, strongly suggests the existence of latent infections.

In San Francisco, 1 of 10 sanitarians engaged in rodent control work agglutinated *Leptospira icterohaemorrhagiae* in a dilution 1:300.

Roos,¹⁹ in an intriguing report on Canicola fever in a family, discovered with the aid of the serologic tests two additional contact infections in a young adult and child, who apparently had passed through a leptospirosis diagnosed as influenza. The original case, which led to the discovery of the focus, suffered from meningitis. These and other less carefully investigated mysterious illnesses rather forcibly indicate that human Canicola disease may masquerade in a community in form of atypical, abortive, and subclinical infections. It is, therefore, recommended that in future all sera submitted to public health laboratories for the Widal or Brucella reaction be subjected to tests with different leptospira strains.

Since at least 40 per cent of the human Weil's infections may not be accompanied by an icterus, the extent of this disease of murine or even canine origin requires further investigation. However, in this connection, it is imperative to extend a word of warning. The bacteriological diagnoses of leptospirosis, in particular the serological tests, require considerable experience and judicious interpretation. Théy

should be, therefore, entrusted to a few properly qualified laboratories.

The facts here recorded amply attest to the increasingly important fact that the animal kingdom is a reservoir of disease.

REFERENCES

1. Blumer, G. *J.A.M.A.*, 81:353, 1923.
2. Pickles, W. N. *Brit. J. Child. Dis.*, 33:192, 1936.
3. Morgan, M. T., and Brown, H. C. *Rep. Pub. Health & Med. Subj.* No. 42, London, 1927.
4. Findlay, G. M., Dunlop, J. L., and Brown, H. C. *Tr. Roy. Soc. Trop. Med. & Hyg.*, 25:7, 1931-1932.
5. Yenikomshian, H. A., and Dennis, E. W. *Tr. Roy. Soc. Trop. Med. & Hyg.*, 32:189, 1938.
6. Packchanian, A. *Bull. Office internat. d'hyg. pub.*, 29:2350, 1937.
7. *J. Bact.*, 36:37, 1938.
8. *Proceedings of the Staff Meetings of the Clinic of Queen's Hospital, Honolulu, T. H.*, March, 1938, Vol. 4, No. 3. Personal Communication.
9. Syverton, J. T., Stiles, W. W., and Berry, G. P. *J. Bact.*, 36:37, 1938.
10. Schüffner, W. *Arch. f. Schiffs- u. Tropen-Hyg.*, 36:239, 1932.
- Schüffner, W., and Walch-Sorgdrager, B. (Mme.). *Bull. Office internat. d'hyg. pub.*, 29:297, 1937.
11. Esseveld, H. Thesis. Amsterdam, 1937.
12. Okell, C. C., Dalling, T., and Pugh, L. P. *Vet. J.*, 81:3, 1925; *Brit. Med. J.*, 1:34, 1925; and *Proc. Roy. Soc. Med.*, 18:17, 1925.
13. Wirth, D. *Wien. klin. Wchnschr.*, 50:1115, 1937.
14. Klarenbeek, A. *Tijdschr. v. Diergeneesk.*, 62:1182, 1935, and *Twelfth Int. Vet. Congress*, New York, 3:349, 1934.
15. Walch-Sorgdrager, B., and Schüffner, W. *Zentralbl. f. Bakteriolog.*, I. Abt., Orig., 141:97, 1938.
16. Molner, J. G., and Kasper, J. A. *J.A.M.A.*, 110:2069, 1938.
17. Petersen, C. B., and Jacobsen, E. *Compt. rend. Soc. de biol.*, 126:797 and 799, 1937.
18. Dhont, C. M., Klarenbeek, A., Schüffner, W. A. P., and Voet, J. *Nederl. Tijdschr. v. geneesk.*, 78:5197, 1934.
19. Roos, C. J., Walch-Sorgdrager, B., and Schüffner, W. A. P. *Nederl. Tijdschr. v. geneesk.*, 81:3324, 1937.
20. Brammer, E., Petersen, C. B., and Scheel-Thomsen, A. *Ugesk. f. laeger*, 100:419, 1938.
21. Krumbein, R., and Frieling, B. *Deutsch. med. Wchnschr.*, 42:564, 1916.
22. Montagu Lawrence, C. J., and Okell, C. C. *Lancet*, II; 327, 1929.
23. Mason, W. N. M. *J. Path. & Bact.*, 46:631, 1938.

Special Syringe for Skin Tests

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THERE are several tests which are commonly conducted on a large scale in the interest of public health, which consist of the injection, intracutaneously, of 0.1 cc. of fluid, usually into the skin of the forearm. The most common, of course, are the Mantoux, Schick, and Dick tests. For conducting such tests on a large scale it is customary to fill a tuberculin syringe or other syringe of a similar nature and to give injections to a series of patients successively, changing the needle before each injection. By this method, as commonly practised, the first individual receives a "full" 0.1 cc. and thereafter individuals receive 0.1 cc. less the amount present in the shank of the needle. If one corrects for this he has a choice of either wasting a large amount of the test material in order to begin each injection on the line, or of using interval markings on the syringe, which frequently leads to considerable error. A number of syringes which are calibrated only in tenths of a cubic centimeter and especially made for this purpose will not permit correction at all. It may be rightly suggested that certain discrepancies in reports have been due to errors caused by this method of procedure when a large group has been tested.

In order to overcome this difficulty a syringe* has been especially devised which takes into account the loss of

fluid in the needle shank. The syringe is made of special resistant glass and

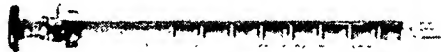


FIGURE I—Special syringe for use in various skin tests, when the same test is being given to large numbers of persons

can be sterilized, either by boiling or by dry baking. It is calibrated to deliver eight doses of 0.1 cc. each, and has primary and secondary markings. Between the primary and secondary markings there is sufficient fluid to fill the shank of a $\frac{5}{8}$ inch, 26 gauge needle. The procedure of injecting is to fill the syringe to the last mark; the first dose is administered by pushing the plunger to the first secondary marking. A new needle is put on and the plunger is pushed in to the second primary marking, thus filling the needle. The second injection is made by administering the contents of the syringe down to the second secondary marking, and so on, until the eight doses are administered. With the use of this syringe the patient gets exactly 0.1 cc. without any danger of misreading the amount.

* This syringe has been especially made by the Becton-Dickinson Co., Rutherford, N. J.

Revision of Methods and Standards for Certified Milk*

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IT seems appropriate that a representative of the American Association of Medical Milk Commissions, a pioneer organization for raising the standards of milk production, should inform the American Public Health Association of progressive changes in Methods and Standards for the Production of Certified Milk.† These methods and standards are revised annually and the production of certified milk may be regarded as a laboratory in which new methods of practical value to the entire dairy industry may be introduced and tested. Such has been the case with the control of tuberculosis, of Bang's disease, and of hemolytic streptococcus infections transmissible from man to the cow and from the cow to man.

In May, 1936, an improved medium for making plate counts of bacteria was adopted for certified milk. A year later the results of using this medium in comparison with the standard nutrient agar of the A.P.H.A. were reported and published in the *American Journal of*

Hygiene (January, 1938). Since then, and on a more limited scale, the new medium has been compared with not only standard nutrient agar but also the "tryptone glucose skim milk agar." The results may be summarized by a quotation from an article in the *American Journal of Public Health* (September, 1938) which reads

A.A.M.M.C. agar . . . has been found to yield considerably higher counts than does the standard nutrient agar of the A.P.H.A., counts of the same magnitude as may be obtained with the "tryptone glucose skim milk agar" . . . The improved medium not only gives a bacterial count that is more nearly true but its adoption serves, in effect, to raise the standard for certified milk.

The A.A.M.M.C. agar in dried form may be obtained from two manufacturers, The Baltimore Biological Laboratory and the Difco Laboratories. At this point it is gratifying to be able to say that since the adoption of this medium the quality of certified milk has continued to improve. In the *Methods and Standards for Certified Milk*, meat infusion agar plus blood is suggested as an alternative medium for making total bacterial plate counts. This medium serves also to reveal the presence of hemolytic streptococci. Blood agar is especially suitable for the examination of unpasteurized certified milk since

* Read before the Laboratory Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

† Copies may be obtained from the American Association of Medical Milk Commissions, Inc., 1265 Broadway, New York, N. Y.

such milk is relatively free from all bacteria other than those which come from the udder. It may not be suitable for grades of milk which are more subject to exogenous contamination by saprophytic bacteria. I should be interested to know what the effect of incubation of agar plates at temperatures lower than 37°C . might be on the bacterial plate counts of certified milk. It might be that the kinds of bacteria found in such milk would not grow so well at lower temperatures as do those found in other grades of milk. Whatever media or temperature may be used, I believe that the American Association of Medical Milk Commissions will favor those methods which give the highest counts.

The determination of coliform counts is being found useful for the control of certified milk production. It is required that certified milk—raw shall not contain more than 10 coliform organisms per cc. and certified milk—pasteurized shall contain no coliform organisms. It is interesting to find that a high coliform count is not always associated with a high total bacterial count. It is in these instances that the coliform count is an indication of a break in the technic of milk production or handling and usually it can be found. Sometimes it is in the cleaning of udders, sometimes in faulty milking, sometimes in dusty stables, sometimes in a faulty valve or dead end of pipe, sometimes in imperfectly sterilized bottling machinery or bottles. In pasteurized milk the presence of coliform organisms indicates either ineffective pasteurization or subsequent contamination of the milk. For a high grade milk the coliform count is a good trouble detector although it is admitted that even the finding of *Escherichia coli* does not have the same significance in milk as in drinking water.

The spore test is of considerable value in maintaining the cleanliness of

certified milk. Pasteurization does not sterilize milk, nor does it kill all of the vegetative bacteria in milk. If, however, milk is heated at 80°C . (176°F .) for 15 minutes the vegetative bacteria are killed and only the spores remain alive. This test for the cleanliness of milk was described by Weinzirl and Veldee in the *American Journal of Public Health* in 1915 and 1921. It is now included in *Methods and Standards for Certified Milk*. I think it must be admitted that if of ten tubes of 10 cc. each of undiluted milk subjected to the spore test, few or none show any bacterial growth, it must be a very clean milk.

The identification of hemolytic streptococci whether in milk or in human throats has been greatly simplified and the time required shortened by the precipitin grouping of Lancefield. The technic referred to in the 1938 edition of *Methods and Standards* and the availability of grouping sera bring this method within the reach of diagnostic and milk control laboratories.² It is now possible to determine the serological group to which a hemolytic streptococcus belongs within 48 hours after the throat swab or milk sample is taken. Simple cultural methods are also described which correlate closely with serological differentiation.

A valuable contribution to the technic for the routine examination of throat swabs in blood agar is the "streak-pour" plate which has been in use at the laboratory of the Maryland State Department of Health for some time. As described in *Methods and Standards* for 1938, the method is as follows.

Streak the swab across one edge of the solidified surface of a nutrient agar plate (preferably infusion agar without blood or dextrose). With the wire loop streak the material from the original streak over the remaining surface of the agar. Over the inoculated surface pour not more than 5 cc. of melted blood agar.



FIGURE I—A blood agar plate streaked with a throat swab. Most of the hemolytic surface colonies were of staphylococci. It was extremely difficult to find any streptococci.



FIGURE II—A "streak-pour" blood agar plate inoculated with the same throat swab as was the plate shown in Figure I. There were some hemolytic surface colonies of staphylococci at the periphery of the plate but the deep hemolytic colonies were of streptococci. As is often the case, the deep colonies of staphylococci were non-hemolytic.

Although for the recognition of streptococci nothing is better than a "pour" plate of properly diluted material, the "streak-pour" plate reduces the labor, saves time, and eliminates the chance involved in making a proper dilution from the swab. It is far superior to the ordinary "streak" blood agar plate as may be illustrated by the Figures I and II.

The certified milk industry is becoming mastitis conscious. I do not refer to the rare cases of mastitis caused by the infection of an udder by a hemolytic streptococcus of human origin which may cause an outbreak of septic sore throat or scarlet fever. In the entire 45 years of the history of certified milk only one such outbreak has occurred and that was 12 years ago, before present methods of control were known or in effect. I refer rather to the ordinary barnyard variety of mastitis which is so common in dairy cattle

throughout the world and the streptococci of which do not cause epidemics among consumers of the milk. Nevertheless, largely for economic and esthetic reasons, progress is being made in the control of bovine mastitis and its elimination from certified milk herds. Beginning this year more detailed herd records are required, the milk of cows entering or reëntering certified milk production is required to undergo bacteriological examination, and an attempt has been made to place the various tests which have been proposed for the early detection of mastitis in their proper perspective.

Safety is only one of the qualities of a superior milk. There are possibilities of improving the flavor and nutritive quality of milk. Flavor may be

a matter of taste and habit but it is now known that the butter fat content is not the only variable nutritive factor in milk although it may be the most obvious one. It is well known that the diet of the cow affects the nutritive quality of her milk, that the winter milk of cows fed on dry feed is inferior to the summer milk of the same cows fed on green pastures. Recently it has also been demonstrated that many of the qualities of summer feed may be preserved for winter feeding by such methods as the rapid artificial drying of hay, the preserving of grasses by molasses (molasses ensilage) or acids (A.I.V. ensilage) and that the vitamin D content of milk may be increased at will by the feeding of irradiated yeast. By such methods winter milk may be made equal to summer milk. This line of progress in dairying is in the making,

is the subject of special instructions issued to the producers of certified milk, and is being followed by many of them.

In conclusion I would urge health officials to take a broader interest in milk than to make it safe. I am convinced that under proper supervision safe raw milk may be produced. In the effort to produce such milk many fundamental problems of milk production become incentives. The solution of these problems is of benefit to the entire dairy industry and to the consuming public. Your coöperation in maintaining the methods and standards for the production of certified milk is invited.

REFERENCE

1. Brown, J. Howard. A Simplified Method for Grouping Hemolytic Streptococci by the Precipitin Reaction. *J.A.M.A.*, III:310-311 (July 23), 1938.

Time Lost by Industrial Workers from Disabling Sickness and Accidents During the Early Days of Disability*

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ONE of the sources of industrial disability data used for a number of years by the Division of Industrial Hygiene of the National Institute of Health is the records of industrial sick benefit organizations. Since the majority of these organizations subscribe to a 7 day waiting period, that is, 7 days must elapse between the onset of disability and the commencement of the payment of benefits, the records of such organizations contain no information on disabilities lasting 7 days or less,¹ and hence the published reports on this material concern themselves only with disabilities lasting 8 days or longer. This situation frequently raises the question of the magnitude of the time lost from short disabilities, and its relation to time lost from disabilities of all durations. An opportunity to study the question presented itself when the requisite data were made available by the record of one day absences or longer that occurred among the employees of

a public utility company in Massachusetts.

For a quarter-century this company has been operating under a liberal disability benefit plan which provides for payment of wages in full or in part during disability beginning with the first day of absence. During the second 6 months of membership an employee is allowed accumulated sick leave of one day per month at full pay. After the first year of membership full pay for continuous disability is allowed for 15 weeks; beyond this time three-fourths to one-fourth of the employee's wages are paid, the period of payment depending upon the number of years of employment with the company. However, for present purposes, all cases of continuous disability extending over 372 calendar days were automatically considered closed at the end of the 372nd day. In all instances *days* refer to calendar days, and absences of less than one full calendar day are omitted.

The analysis covers the 5 years, 1933-1937. The number of male person-years of membership was 12,969, while the number for females was 3,272. This membership is equivalent to the exposure for one year of 12,969 males and 3,272 females. In the analysis no

* Read before the Industrial Hygiene Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938. In connection with this paper the reader is referred to *Public Health Reports*, 53: 1273-1288 (July 29), 1938.

TABLE I—FREQUENCY OF ABSENCES LASTING ONE CALENDAR DAY OR LONGER, AND PERCENTAGE OF TOTAL EMPLOYEES OF A PUBLIC UTILITY,

[Number of person-years of membership:

Day of Disability After Onset	Annual Number of Absences per 1,000 Persons				Percentage of Total Days of Disability				Annual Number per 1,000	
	Males		Females		Males		Females		Males	
	Daily	Cumulative	Daily	Cumulative	Daily	Cumulative	Daily	Cumulative	Daily	Cumulative
1st	900.0	900.0	1,820.3	1,820.3	12.0	12.0	16.8	16.8	538.0	538.0
2nd	695.3	1,595.3	1,226.8	3,047.1	9.2	21.2	11.3	28.1	430.1	968.1
3rd	543.2	2,138.5	842.6	3,889.7	7.2	28.4	7.8	35.9	336.6	1,304.7
4th	415.4	2,553.9	613.7	4,503.4	5.5	33.9	5.7	41.6	251.4	1,556.1
5th	329.4	2,883.3	471.3	4,974.7	4.4	38.3	4.3	45.9	193.5	1,749.6
6th	262.1	3,145.4	384.2	5,358.9	3.5	41.8	3.5	49.4	145.7	1,895.3
7th	205.6	3,351.0	313.6	5,672.5	2.7	44.5	2.9	52.3	105.6	2,000.9
8th	153.1	3,504.1	231.7	5,904.2	2.0	46.5	2.1	54.4	70.0	2,070.9
9th	135.2	3,639.3	206.9	6,111.1	1.8	48.3	1.9	56.3	57.9	2,128.8
10th	121.7	3,761.0	184.3	6,295.4	1.6	49.9	1.7	58.0	49.1	2,177.9
11th	110.0	3,871.0	162.3	6,457.7	1.5	51.4	1.5	59.5	41.7	2,219.6
12th	99.5	3,970.5	147.0	6,604.7	1.3	52.7	1.4	60.9	35.4	2,255.0
13th	91.1	4,061.6	131.1	6,735.8	1.2	53.9	1.2	62.1	30.4	2,285.4
14th	83.4	4,145.0	119.8	6,855.6	1.1	55.0	1.1	63.2	26.5	2,311.9
15th	71.6	4,216.6	102.1	6,957.7	1.0	56.0	0.9	64.1	20.0	2,331.9
16th	69.2	4,285.8	99.3	7,057.0	0.9	56.9	0.9	65.0	18.6	2,350.5
17th	67.2	4,353.0	96.9	7,153.9	0.9	57.8	0.9	65.9	17.8	2,368.3
18th	65.8	4,418.8	92.9	7,246.8	0.9	58.7	0.9	66.8	17.0	2,385.5
19th	63.7	4,482.5	89.9	7,336.7	0.9	59.6	0.8	67.6	16.0	2,401.3
20th	61.8	4,544.3	85.9	7,422.6	0.8	60.4	0.8	68.4	15.3	2,416.6
21st	59.2	4,603.5	82.5	7,505.1	0.8	61.2	0.8	69.2	14.4	2,431.0
* * * * *	—	—	—	—	—	—	—	—	—	—
372nd	2.2	7,518.2	2.1	10,855.1	0.03	100.0	0.02	100.0	0.5	2,977.2
Total for 372 days..	900.0	—	1,820.3	—	100.0	—	100.0	—	538.0	—
Nonrespiratory-nondigestive diseases ³										
1st	150.5	150.5	500.9	500.9	6.1	6.1	16.2	16.2	45.6	45.6
2nd	120.4	270.9	274.1	775.0	4.9	11.0	8.9	25.1	38.5	84.1
3rd	99.6	370.5	177.3	952.3	4.1	15.1	5.7	30.8	32.5	116.6
4th	82.8	453.3	128.4	1,080.7	3.4	18.5	4.1	34.9	27.2	143.8
5th	70.2	523.5	101.2	1,181.9	2.9	21.4	3.3	38.2	23.0	166.8
6th	59.8	583.3	87.1	1,269.0	2.4	23.8	2.8	41.0	20.2	187.0
7th	51.0	634.3	76.7	1,345.7	2.1	25.9	2.5	43.5	17.6	204.6
8th	42.3	676.6	59.3	1,405.0	1.7	27.6	1.9	45.4	14.2	218.8
9th	39.2	715.8	53.8	1,458.8	1.6	29.2	1.7	47.1	12.7	231.5
10th	36.9	752.7	50.4	1,509.2	1.5	30.7	1.6	48.7	11.7	243.2
11th	34.4	787.1	46.1	1,555.3	1.4	32.1	1.5	50.2	10.8	254.0
12th	31.7	818.8	44.0	1,599.3	1.3	33.4	1.4	51.6	10.5	264.5
13th	30.2	849.0	40.7	1,640.0	1.2	34.6	1.3	52.9	9.7	274.2
14th	28.3	877.3	37.5	1,677.3	1.1	35.7	1.2	54.1	9.0	285.2
15th	25.4	902.7	34.2	1,711.5	1.0	36.7	1.1	55.2	7.5	290.7
16th	24.8	927.5	33.3	1,744.8	1.0	37.7	1.1	56.3	7.4	298.1
17th	24.3	951.8	33.0	1,777.8	1.0	38.7	1.1	57.4	7.2	305.3
18th	23.8	975.6	32.1	1,809.9	1.0	39.7	1.0	58.4	7.1	312.4
19th	23.1	998.7	31.5	1,841.4	0.9	40.6	1.0	59.4	6.9	319.3
20th	22.4	1,021.1	31.5	1,872.9	0.9	41.5	1.0	60.4	6.8	326.1
21st	21.7	1,042.8	30.5	1,903.4	0.9	42.4	1.0	61.4	6.6	332.7
* * * * *	—	—	—	—	—	—	—	—	—	—
372nd	1.4	2,456.1	0.3	3,100.5	0.1	100.0	0.01	100.0	0.2	616.4
Total for 372 days..	150.5	—	500.9	—	100.0	—	100.0	—	45.6	—

¹ The number of days of disability is the number of calendar days from the date disability began to the date of return to work, or to the 372nd day, inclusive. For a specific day, the number of absences is the same as the number of persons absent, and the number of days absent, respectively.

² Number of absences: Males, 11,672; females, 5,956. Number of days of disability: Males, 97,504; females, 35,515.

³ Number of absences: Males, 6,977; females, 3,078. Number of days of disability: Males, 38,611; females, 17,335.

DAYS OF DISABILITY, ACCORDING TO BROAD CAUSE GROUPS, BY SPECIFIC DAY AFTER ONSET; EXPERIENCE OF 1933-1937, INCLUSIVE ¹

Males, 12,969; females, 3,272.]

of Absences Persons		Percentage of Total Days of Disability				Annual Number of Absences per 1,000 Persons				Percentage of Total Days of Disability			
Females		Males		Females		Males		Females		Males		Females	
Daily	Cumulative	Daily	Cumulative	Daily	Cumulative	Daily	Cumulative	Daily	Cumulative	Daily	Cumulative	Daily	Cumulative
Respiratory diseases ²						Digestive diseases ¹							
940.7	940.7	18.1	18.1	17.8	17.8	148.3	148.3	298.3	298.3	15.3	15.3	19.6	19.6
727.4	1,668.1	14.4	32.5	13.7	31.5	89.8	238.1	164.4	462.7	9.3	24.6	10.8	30.4
524.1	2,192.2	11.3	43.8	9.9	41.4	59.1	297.2	95.0	557.7	6.1	30.7	6.3	36.7
387.5	2,579.7	8.5	52.3	7.3	48.7	39.2	336.4	60.5	618.2	4.0	34.7	4.0	40.7
293.7	2,873.4	6.5	58.8	5.5	54.2	28.7	365.1	45.3	663.5	3.0	37.7	3.0	43.7
235.0	3,108.4	4.9	63.7	4.4	58.6	23.4	388.5	35.5	699.0	2.4	40.1	2.3	46.0
183.7	3,292.1	3.5	67.2	3.5	62.1	19.2	407.7	30.6	729.6	2.0	42.1	2.0	48.0
130.2	3,422.3	2.4	69.6	2.5	64.6	15.3	423.0	23.6	753.2	1.6	43.7	1.6	49.6
113.1	3,535.4	1.9	71.5	2.1	66.7	14.5	437.5	22.3	775.5	1.5	45.2	1.5	51.1
96.6	3,632.0	1.7	73.2	1.8	68.5	13.6	451.1	20.5	796.0	1.4	46.6	1.3	52.4
81.0	3,713.0	1.4	74.6	1.5	70.0	13.1	464.2	19.3	815.3	1.4	48.0	1.3	53.7
71.2	3,784.2	1.2	75.8	1.4	71.4	12.6	476.8	17.1	832.4	1.3	49.3	1.1	54.8
59.9	3,844.1	1.0	76.8	1.1	72.5	12.0	488.8	16.5	848.9	1.2	50.5	1.1	55.9
53.2	3,897.3	0.9	77.7	1.0	73.5	11.4	500.2	16.2	865.1	1.2	51.7	1.1	57.0
42.2	3,939.5	0.7	78.4	0.8	74.3	10.9	511.1	14.4	879.5	1.1	52.8	1.0	58.0
40.3	3,979.8	0.6	79.0	0.8	75.1	10.9	522.0	14.4	893.9	1.1	53.9	1.0	59.0
38.8	4,018.6	0.6	79.6	0.7	75.8	10.5	532.5	14.1	908.0	1.1	55.0	0.9	59.9
36.0	4,054.6	0.6	80.2	0.7	76.5	10.5	543.0	14.1	922.1	1.1	56.1	0.9	60.8
33.9	4,088.5	0.5	80.7	0.6	77.1	10.4	553.4	14.1	936.2	1.1	57.2	0.9	61.7
30.5	4,119.0	0.5	81.2	0.6	77.7	10.4	563.8	14.1	950.3	1.1	58.3	0.9	62.6
29.1	4,148.1	0.5	81.7	0.5	78.2	10.1	573.9	14.0	964.3	1.0	59.3	0.9	63.5
**	**	*	**	*	**	**	**	**	**	*	**	*	**
0.9	5,298.0	0.02	100.0	0.02	100.0	0	967.1	0.3	1,518.9	0	100.0	0.02	100.0
940.7	—	100.0	—	100.0	—	148.3	—	298.3	—	100.0	—	100.0	—

Nonindustrial accidents ⁶						Industrial accidents ⁷							
77.0	77.0	7.4	7.4	9.6	9.6	17.6	17.6	3.4	3.4	3.5	3.5	2.5	2.5
58.1	135.1	6.2	13.6	7.2	16.8	16.5	34.1	2.8	6.2	3.3	6.8	2.0	4.5
43.4	178.5	5.3	18.9	5.4	22.2	15.4	49.5	2.8	9.0	3.1	9.9	2.0	6.5
35.2	213.7	4.4	23.3	4.4	26.6	14.8	64.3	2.1	11.1	2.9	12.8	1.6	8.1
29.6	243.3	3.7	27.0	3.7	30.3	14.0	78.3	1.5	12.6	2.8	15.6	1.1	9.2
25.1	268.4	3.3	30.3	3.1	33.4	13.0	91.3	1.5	14.1	2.6	18.2	1.1	10.3
21.1	289.5	2.9	33.2	2.6	36.0	12.2	103.5	1.5	15.6	2.4	20.6	1.1	11.4
17.1	306.6	2.3	35.5	2.1	38.1	11.3	114.8	1.5	17.1	2.3	22.9	1.1	12.5
16.2	322.8	2.1	37.6	2.0	40.1	10.9	125.7	1.5	18.6	2.2	25.1	1.1	13.6
15.6	338.4	1.9	39.5	2.0	42.1	10.4	136.1	1.2	19.8	2.1	27.2	0.9	14.5
14.7	353.1	1.7	41.2	1.8	43.9	10.0	146.1	1.2	21.0	2.0	29.2	0.9	15.4
13.8	366.9	1.7	42.9	1.7	45.6	9.3	155.4	0.9	21.9	1.9	31.1	0.7	16.1
13.1	380.0	1.6	44.5	1.6	47.2	8.8	164.2	0.9	22.8	1.7	32.8	0.7	16.8
12.5	392.5	1.5	46.0	1.6	48.8	8.2	172.4	0.6	23.4	1.6	34.4	0.5	17.3
10.7	403.2	1.2	47.2	1.3	50.1	7.8	180.2	0.6	24.0	1.5	35.9	0.5	17.8
10.7	413.9	1.2	48.4	1.3	51.4	7.5	187.7	0.6	24.6	1.5	37.4	0.5	18.3
10.4	424.3	1.2	49.6	1.3	52.7	7.4	195.1	0.6	25.2	1.5	38.9	0.5	18.8
10.1	434.4	1.1	50.7	1.3	54.0	7.4	202.5	0.6	25.8	1.5	40.4	0.5	19.3
9.8	444.2	1.1	51.8	1.2	55.2	7.3	209.8	0.6	26.4	1.4	41.8	0.5	19.8
9.2	453.4	1.1	52.9	1.2	56.4	6.9	216.7	0.6	27.0	1.4	43.2	0.4	20.2
8.6	462.0	1.1	54.0	1.1	57.5	6.4	223.1	0.3	27.3	1.3	44.5	0.2	20.4
**	**	*	**	*	**	**	**	**	**	*	**	*	**
0.3	802.9	0.03	100.0	0.04	100.0	0.1	501.4	0.3	134.8	0.02	100.0	0.2	100.0
77.0	—	100.0	—	100.0	—	17.6	—	3.4	—	100.0	—	100.0	—

⁴ Number of absences: Males, 1,923; females, 976. Number of days of disability: Males, 12,542; females, 4,970.

⁵ Number of absences: Males, 1,952; females, 1,659. Number of days of disability: Males, 31,854; females, 10,145.

⁶ Number of absences: Males, 592; females, 252. Number of days of disability: Males, 7,994; females, 2,627.

⁷ Number of absences: Males, 228; females, 11. Number of days of disability: Males, 6,593; females, 441.

reference is made to the age of the employees. It is sufficient to state at this time that according to the Bureau of the Census² the native white gainful male workers in 1930, under 35 years of age constituted 47 per cent of the total of ages 18 through 69 years, while the corresponding percentage for females was 64, and that in the instance of the present group of employees, the corresponding percentages for males and females, respectively, were 42 and 68. For male employees the number of absences lasting one calendar day or longer from all disabilities which ended during the 5 year period was 11,672 with 97,504 days of disability, and for female employees, the corresponding figures were 5,956 and 35,518, respectively. The causes of disability have been broadly grouped into respiratory diseases, digestive diseases, nonrespiratory-nondigestive diseases, nonindustrial accidents, and industrial accidents. Approximately 13 per cent of the absences were diagnosed by the company physician, 72 per cent by the plant nurse, and 15 per cent by the patient.

Table I shows, by sex and broad cause group, the frequency of absences together with the percentage of total days of disability for each day after onset of disability through the 21st day. This table contains all of the fundamental data necessary for the analysis, the development of the figures which are shown later, and the determination of the actual numbers upon which rates are based. To conserve space no tables derivable from Table I will be presented. In some instances, and these will be indicated in the titles to the figures, a simple calculation will be necessary to yield a particular figure. It should be borne in mind that for a specific day after onset of disability, the number of absences is the same as the number of employees absent, and the number of days absent, respectively.

ANALYSIS OF DATA

Percentage distribution, according to broad cause groups, of days lost on specific days of disability after onset—Figure I shows for both sexes the percentage distribution, according to broad cause groups, of days lost on specific days of disability after onset through the 21st day of disability. Thus among the males, of the total first-days lost, 60 per cent were accounted for by the respiratory diseases, 16 per cent by the digestive diseases, almost 17 per cent by the nonrespiratory-nondigestive diseases, 5 per cent by nonindustrial accidents, and 2 per cent by industrial accidents. The pattern of the figure is determined by the duration and frequency of the various disabilities entering the 5 cause groups. Thus if all of the disabilities had lasted 21 days, and if the same frequency had been yielded by each cause group, the resulting pattern would consist of 5 rectangles of equal area.

Among the males the percentage for the respiratory diseases ranks first in magnitude on each of the first 13 days, the percentage rising from 60 on the first day to 62 on the 3rd day and then gradually decreasing to 33 per cent on the 13th day. During this period the percentage for the nonrespiratory-nondigestive diseases gradually increases from 17 to 33 per cent, thus on the 13th day equalling the percentage for the respiratory diseases. On the 14th day and on each day thereafter the percentage for the nonrespiratory-nondigestive diseases is sufficiently large to assume first place among the percentages corresponding to the different cause groups. In the instance of the females the same phenomenon is evident not on the 14th day but on the 20th on which day the percentage for the respiratory diseases has dropped to 36 and the percentage for the nonrespiratory-nondigestive diseases has increased to 37. The observable sex

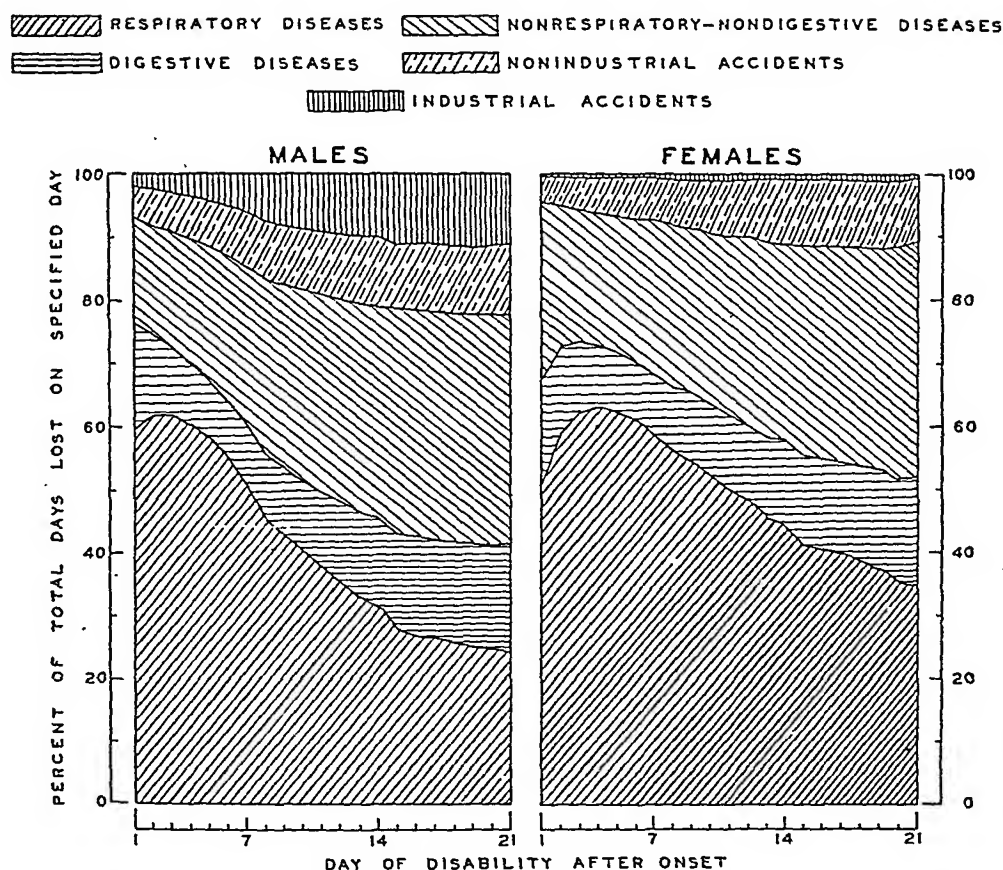


FIGURE I—Percentage distribution, according to broad cause groups, of days lost on specific days of disability after onset, employees of a public utility, 1933-1937. (Plotted points calculated from Table I.)

difference with respect to the non-respiratory-nondigestive diseases during the first 2 days is probably accounted for by dysmenorrhea.

The percentages for the digestive diseases are of a lower order of magnitude beginning, among the males, at 16 per cent, falling to a minimum of 8.7 per cent on the 5th day, and gradually increasing to 17 per cent on the 21st day: the behavior of the percentages among the females is approximately similar to that of the males.

The percentages for nonindustrial accidents among the males gradually increase from 5 per cent on the first day to 11 per cent on the 21st day, and among the females the corresponding increase is from 4 to 10 per cent. Among the males the percentages for

industrial accidents gradually increase from 2 to 11, while among the females they never become greater than 0.74 per cent during the first 21 days after onset of disability.

Frequency of absences, according to broad cause groups, on specific days of disability after onset—The frequency of absences from broad cause groups on specific days of disability after onset through the 21st day of disability is shown, among other things, in Table I, and graphically in Figure II (left-hand scale). It will be observed that with respect to all disabilities among the males there is an orderly decrease from 900 absences per 1,000 on the first day of disability to 59 on the 21st day; the females, however, on the first day yield a frequency of over 1,800 which de-

creases at a similar rate to 83 on the 21st day. Thus the females show a higher incidence than the males throughout the first 3 weeks of disability, but as duration increases the proportionate difference decreases; beyond the 21st day the difference becomes zero and finally negative. Although the males experienced 900.0 first day absences per 1,000 and the females 1,820.3 per 1,000, only 153.1 absences per 1,000 for males (17 per cent), and 231.7 absences per 1,000 for females (13 per cent) extended through the 8th day. It is of interest to observe the percentage composition of these 8th day absences by cause group (Figure I). Of the 153.1 8th day absences per 1,000 among males 46 per cent are accounted for by respiratory diseases, 28 per cent by nonrespiratory-nondigestive diseases, 10 per cent by digestive disease, 9 per cent by nonindustrial accidents, and 7 per cent by industrial accidents; the corresponding percentages for the females are, respectively, 56, 26, 10, 7, and 0.7.

Of interest also is the percentage of first day absences continuing through the 8th day according to cause group. With

the use of data in Table I it will be found that of the first day absences from industrial accidents among the males, 64 per cent continued through the 8th day, the corresponding percentage among the females being 44.

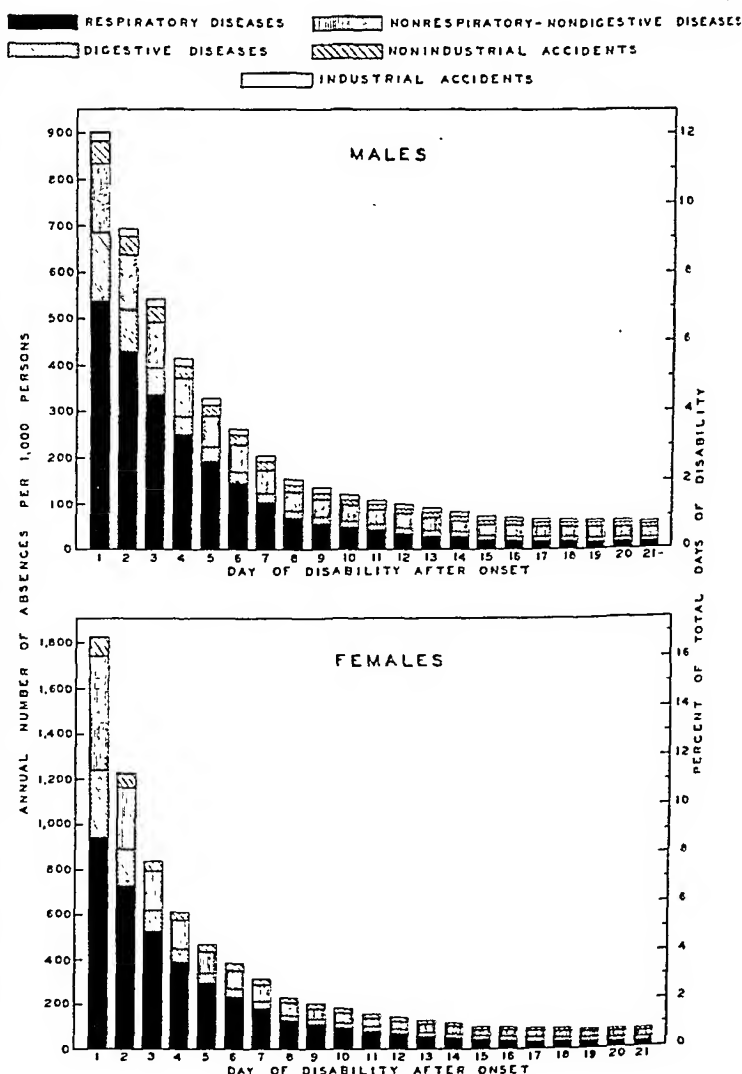


FIGURE II—*Left-hand scale:* Annual number of absences per 1,000 persons according to broad cause groups on specific days of disability after onset, employees of a public utility, 1933-1937. (Plotted directly from Table I. The vertical scales for males and females, respectively, are different. The industrial accidents among the female employees are not shown.) *Right-hand scale:* Per cent of total days of disability (1933-1937) corresponding to each day of disability after onset. (Plotted points calculated from Table I.)

The corresponding percentages for males and females, respectively, with respect to the other cause groups are, nonindustrial accidents, 31 and 22 per cent; nonrespiratory-nondigestive diseases, 28 and 12 per cent; respiratory diseases, approximately 14 per cent for both sexes; and digestive diseases, 10 and 8 per cent.

Percentage of total days of disability (1933-1937), according to broad cause groups, on specific days of disability after onset—The right-hand scale of Figure II shows for each broad cause group the percentage of the total days of disability (1933-1937) on specific days after onset of disability. Thus with regard to all disabilities, 12.0 per cent of the total days of disability among the males occurred during the first day after onset while the corresponding percentage for the females is 16.8, both percentages decreasing in an orderly manner to less than 0.8 per cent on the 21st day. The difference between the percentages for males and females becomes rapidly smaller as duration increases to the 5th day; thereafter the differences approximate zero, and finally become negative.

The daily percentage contribution of each broad cause group to the total days of disability graphically presented in Figure II shows that the percentages for each cause group gradually decline during the first 21 days of disability. Thus in the instance of the respiratory diseases among the males the percentage declines from over 7 on the first day to less than 0.2 on the 21st day; among the females the decline is from nearly 9 to less than 0.3 per cent. The percentage for the digestive diseases on the first day is less than 2 for the males and almost 3 for the females; both percentages become approximately 0.1 on the 21st day. For the nonrespiratory-nondigestive diseases the percentages on the first day for males and females, respectively, read 2 and 4.6, declining in

both instances to less than 0.3 on the 21st day. Nonindustrial accidents among the males and females, respectively, contribute 0.6 and 0.7 per cent on the first day and decline to 0.09 and 0.08, respectively. Finally, among the males industrial accidents yield 0.23 per cent on the first day and 0.09 per cent on the 21st, the corresponding percentages for the females (not shown in the figure) being 0.03 and 0.01, respectively.

Figure III shows the result of placing end to end the first 7 bars of Figure II. These bars, as indicated previously, represent for each sex and for each of the first 7 days of disability after onset, the percentage contribution to the total days of disability (1933-1937) by all cause groups and by specific cause groups. In particular the figure reflects an important sex difference, namely, the higher frequency among the females of absences of short duration. Thus in the instance of the males nearly 45 per cent of the total days of disability are accounted for by the first 7 days while the corresponding percentage for the females is over 52. The largest differences of the percentages with respect to sex occur in order of decreasing magnitude on the first, second, and third days, respectively.

Annual number of days lost per person from onset of disability through the 21st day after onset, or during any selected interval within these end points—The cumulative number of days of disability per 1,000 persons (annual basis) for specific days after onset is shown in Table I by sex, and broad cause group. It will be observed that the annual frequency for all causes increases from 0.9 day per male on the first day to 7.5 days per male for the total period of 372 days: the corresponding rates for females are 1.8 and 10.9. During the first 7 days the annual frequency is 3.4 days per male and

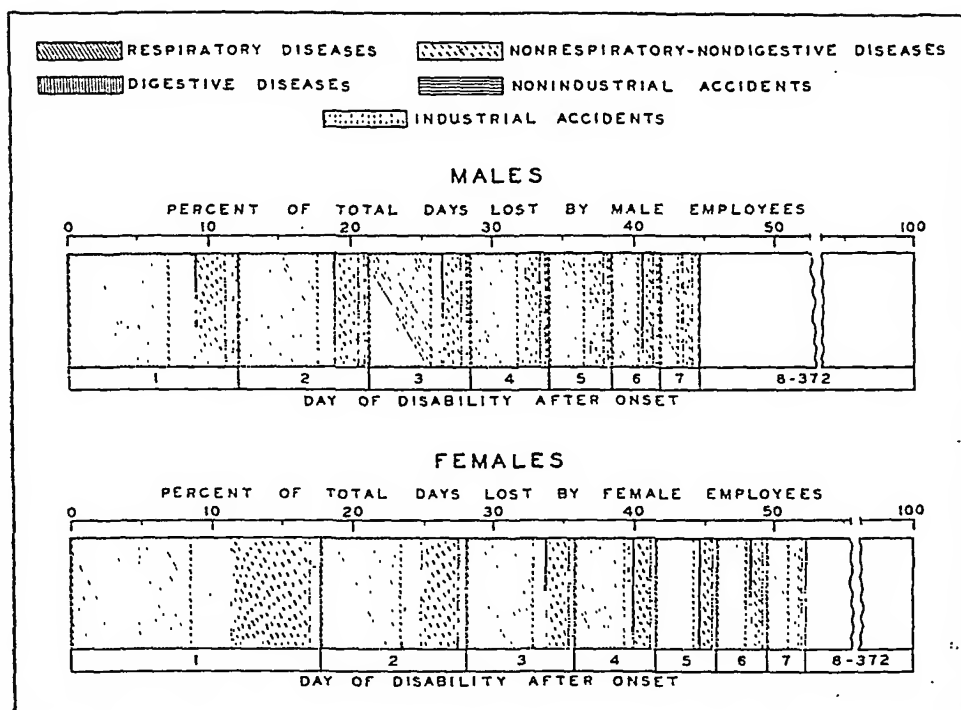


FIGURE III—Per cent of total days of disability (1933-1937) according to broad cause groups on specific days of disability after onset. (Bars for the first 7 days of Figure II placed end to end. The industrial accidents among the female employees are not shown.)

5.7 per female. These frequencies together with those for the different broad cause groups are shown graphically in Figure IV from onset of disability through the 21st day after onset; in Figure IV-A the frequencies corresponding to all causes and the different cause groups are compared for the males and females, respectively, while in IV-B the frequencies for the males and females are compared for all causes and each cause group, respectively. It will be observed in IV-A that the curves for the different cause groups are arranged in the same order regardless of sex, and that in IV-B, with the exception of industrial accidents, the curves for the females for each cause group lie above the corresponding ones for the males.

From Figure IV it is possible to determine approximately, and more precisely from Table I, for either sex and for all causes or for specific cause

groups the annual number of days lost per person for any chosen interval of time within the first and 21st days after onset of disability. Thus if the interval is defined by the 8th and 12th days it is necessary only to find the difference between the appropriate cumulative frequencies shown for the 7th and 12th days, respectively.

Percentage of total days lost (1933-1937) from onset of disability through the 21st day after onset, or during any selected interval within these end points—Calculations based on figures recorded in Table I show that of the total number of 97,504 days lost by the males 39 per cent are accounted for by the respiratory diseases, 33 per cent by the nonrespiratory-nondigestive diseases, 13 per cent by the digestive diseases, 8 per cent by nonindustrial accidents, and 7 per cent by industrial accidents. The corresponding per-

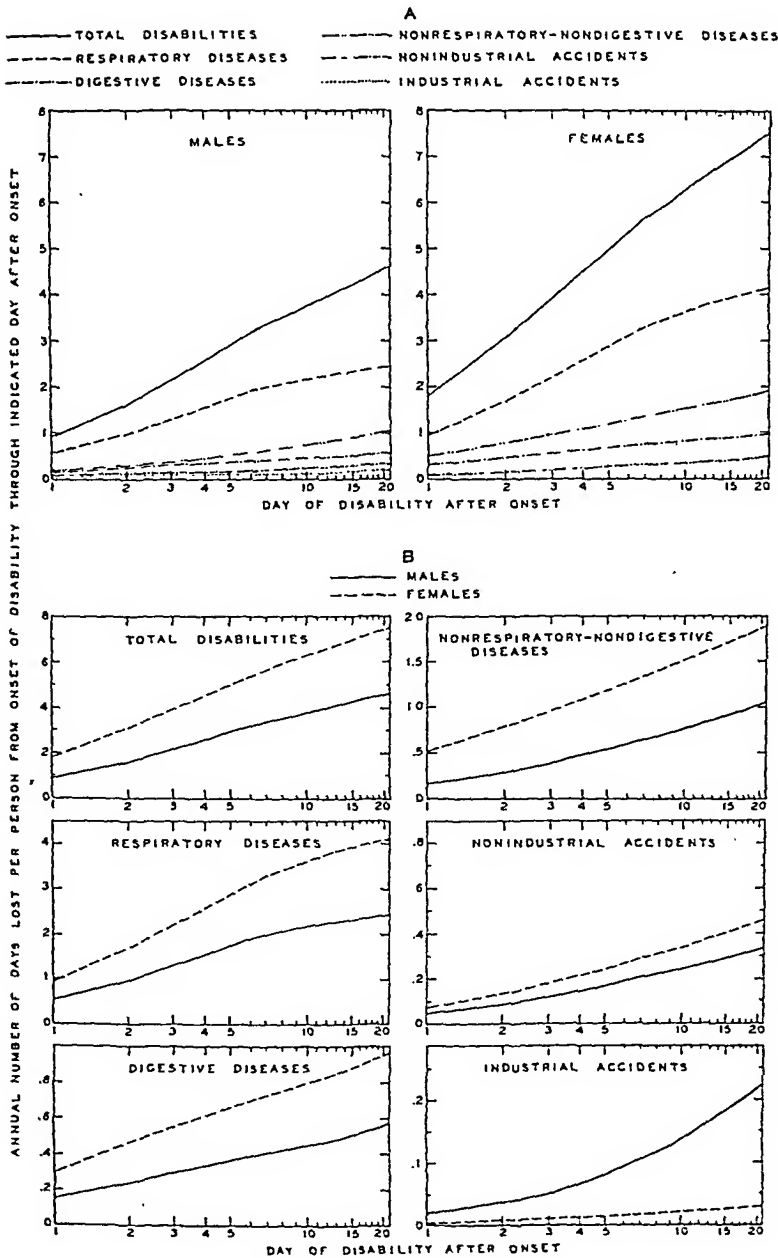


FIGURE IV — Annual number of days lost per person from onset of disability through the indicated day after onset, according to broad cause groups, employees of a public utility, 1933-1937. (Plotted from Table I after dividing the appropriate figures by 1,000. Logarithmic horizontal scale. Note changes in the vertical scale in passing from A to B.) A. Frequencies corresponding to all causes and the different cause groups compared for males and females, respectively. (The industrial accidents among the female employees are not shown.) B. Frequencies for males and females compared for all causes and each cause group, respectively.

centages for the females who lost a total of 35,518 days are, respectively, 49, 29, 14, 7, and 1.

The foregoing percentages are cumulative covering the first 372 days after onset of disability. Of interest are the cumulative percentages for specific days after onset of disability. By transforming the vertical scales of Figure IV-A for the males and females, respectively, these cumulative percentages will be shown graphically by the

curves as drawn.* Thus 44.57 per cent of all days of disability among the males occurred during the first 7 days, the respiratory diseases, nonrespiratory-nondigestive diseases, nonindustrial accidents, and industrial accidents, respectively, accounting for 26.62, 8.44, 5.42, 2.72, and 1.37 per cent of all days

* One unit on the vertical scale for the males, Figure IV-A, is equivalent to 13.30 per cent; for the females, the equivalent is 9.21 per cent.

lost; among the females the corresponding percentages for all causes and specific cause groups are, respectively, 52.26, 30.33, 12.40, 6.72, 2.67, and 0.14. If the vertical scales of Figure IV-A are transformed as previously indicated, the cumulative percentages of all days lost may be read for all causes and each cause group for any interval after onset of disability within the first 21 days.

Thus far in this section the examination of cumulative percentages of days lost has been restricted to the universe of all days lost (1933-1937) and the days lost on account of each cause group were related to this specific universe. The remainder of the section will be devoted to an examination of cumulative percentages related to component universes representing all days lost from the respective cause groups, the object being to present sufficient material that will enable the reader to answer questions such as the following: What percentage of all days lost from the respiratory diseases occurred during the first 7 days after onset? What is the magnitude of the interval in days after onset that accounts for 50 per cent of the days lost from the respiratory diseases?

The cumulative percentages suggested are shown in Table I and are presented graphically in Figure V. In Figure V-A the cumulative percentages corresponding to all causes and the different cause groups are compared for males and females, respectively, while in Figure V-B the cumulative percentages for males and females are compared for all causes and each cause group, respectively.

It will be observed in Figure V-A that the cumulative percentage curves cross each other in some instances; it is not possible, therefore, to arrange the curves in any definite order. With respect to the males the curves rise, with the exception of the curve for respiratory diseases, within a band ap-

proximately 25 per cent wide, while the curves for the females, with the exception of the one for industrial accidents, rise within a band of similar width.

In the comparison of the sexes with respect to cause group, shown in Figure V-B, it is seen that the curve for the males lies consistently above that for the females in the instances of the respiratory diseases and industrial accidents, respectively; with respect to the remaining cause groups and all causes, the curve for the males lies consistently below that for the females. Apparently the most striking sex difference is shown by the nonrespiratory-nondigestive diseases; in this instance the curve for the females after the second day after onset lies consistently above that for the males at a distance equivalent to approximately 20 per cent on the vertical scale. This means that of all days lost and accounted for by the nonrespiratory-nondigestive diseases the females lost a greater proportion during the early days of disability than the males. For example, 60 per cent of such days were lost by the females during the first 21 days after onset of disability while the corresponding percentage for the males is 42.

The question now arises of the percentage of days of disability accounted for by the first 7 days after onset of disability. These percentages for the males and the females, respectively, are for each cause group as follows: respiratory diseases, 67 and 62; digestive diseases, 42 and 48; nonindustrial accidents, 33 and 36; nonrespiratory-nondigestive diseases, 26 and 44; and industrial accidents, 21 and 11. As stated previously the corresponding percentages for all causes are 45 for the males, and 52 for the females.

Another question of interest with respect to all causes and each cause group concerns the specific day of disability after onset on which the cumulative percentage of days lost attains the

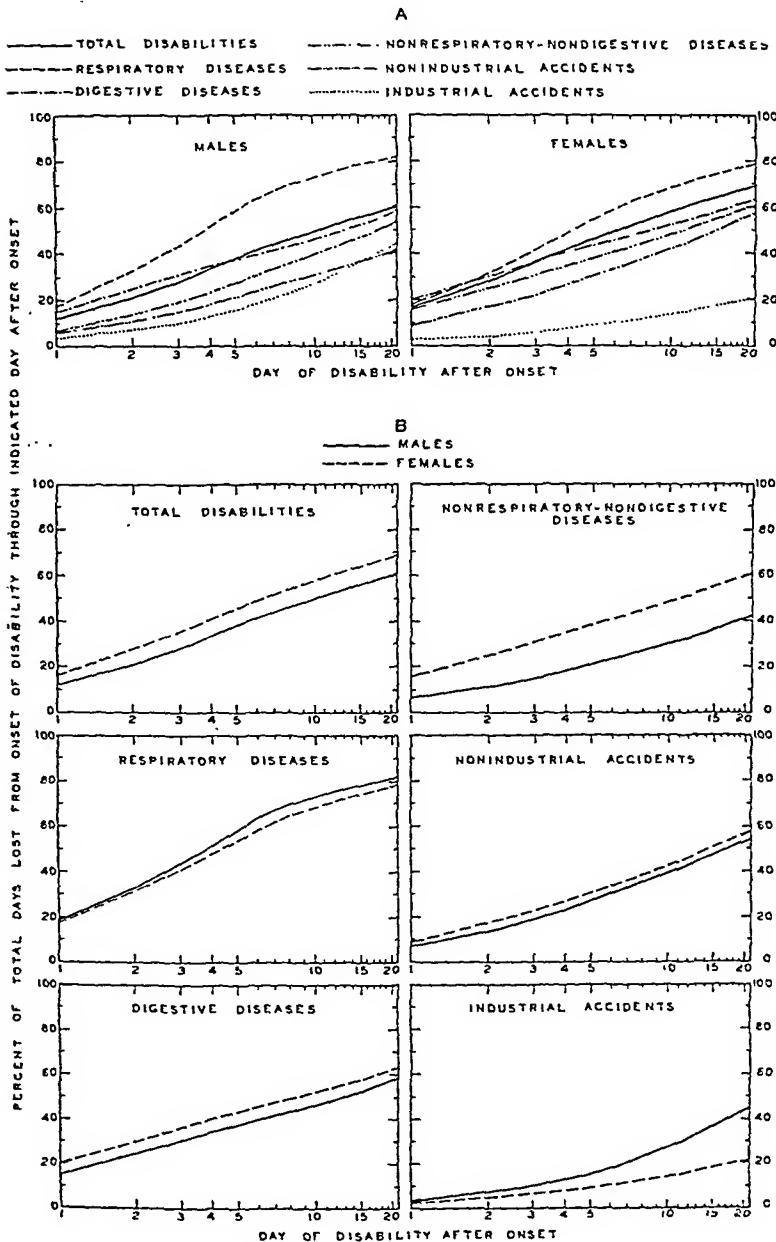


FIGURE V—Percentage of total days lost (1933-1937) from onset of disability through the indicated day after onset, according to broad cause groups, employees of a public utility, 1933-1937. Each broad cause group is considered a universe; thus in the instance of the respiratory diseases the male employees lost on the first day of disability 18 per cent of their total days of disability caused by the respiratory diseases. (Plotted directly from Table I. Logarithmic horizontal scale.) A. Percentages corresponding to all causes and the different cause groups compared for males and females, respectively. B. Percentages for males and females compared for all causes and each cause group, respectively.

value of approximately 50 per cent. This particular day for all causes is the 10th for males, and the 6th for females. The particular days for the specific cause groups for males and females, respectively, are: respiratory diseases, 4th day, both sexes; digestive diseases, 12th day and 8th day; nonindustrial accidents, 17th day and 15th day; nonrespiratory-nondigestive diseases, after the 21st day, and 11th day; and industrial accidents, both sexes after the 21st day.

SUMMARY

Reports on sickness and accidents causing disability lasting one calendar day or longer and ending during the 5 years, 1933-1937, among the employees of a public utility furnish the requisite data for the study of the relation of time lost from disabilities lasting less than 8 calendar days to the total time lost from all disabilities. This relation is important since the majority of sick benefit organizations subscribe to a 7 day waiting period and thus the

records of these organizations contain no information on cases of less than 8 calendar days' duration.

The 12,969 male person-years of membership in the benefit plan yielded 11,672 absences which accounted for 97,504 days of disability while the 3,272 female person-years yielded 5,956 absences which accounted for 35,518 days of disability.

Of the total days of disability from the respiratory diseases, 67 per cent among the males, and 62 per cent among the females, occurred during the first 7 days of disability after onset. The corresponding percentages for the males and females, respectively, for each of the remaining cause groups are as follows: digestive diseases, 42 and 48; nonindustrial accidents, 33 and 36; nonrespiratory-nondigestive diseases, 26 and 44; and industrial accidents, 21 and

11. The corresponding percentages for all causes are 45 for the males, and 52 for the females.

Charts and data are presented which make possible the determination of the percentage of total days lost during any interval within the first 3 weeks after onset of disability. Thus while the report deals principally with the possible effect of a 7 day waiting period on recorded lost time from disability sufficient material is presented which yields information on the possible effect of a waiting period of any length up to and including 21 days.

REFERENCES

1. Sayers, R. R., Kroeger, G., and Gafafer, W. M. General Aspects and Functions of the Sick Benefit Organization. *Pub. Health Rep.*, 52:1563-1580, 1937. (Reprint No. 1874.)
2. U. S. Department of Commerce, Bureau of the Census: *Fifteenth Census of the United States, 1930. Population, v. 5, General Report on Occupations.* Government Printing Office, Washington, D. C., 1933. Pp. 138-139.

DISCUSSION

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IN discussing Dr. Gafafer's paper I could limit myself to one sentence. He has set up an excellent pattern for the representation of morbidity conditions of an industry and has made it possible to compare one industry with another in a uniform way. He has done more than this. He has shown us the relationship between the time lost during the first 7 days of disability and that after 7 days; the broad causes of this time lost and the important influence of sex on disabilities according to broad causes and length of disability.

I will limit myself to his statistics for males because the foundry group I wish

to compare with his is composed of 94 per cent males.

Dr. Gafafer has by his statistical treatment of disability during the first 7 days, opened an entirely new and important field of industrial medicine in its relation to public health. He has demonstrated clearly that when we fail to keep a record of disabilities of 7 days or less we are missing 44 per cent or more of the days of disability in males due to sickness or injury in industry. How many would have realized that the days of disability occurring prior to the 8th day would have amounted to such a large percentage of total days of disa-

bility? When these days of disability prior to the 8th day are broken down into their broad causes the results are more significant. For example he has shown us that by the 4th day, 50 per cent of the days of disability due to respiratory diseases has occurred, and that by the 7th day 67 per cent of disabilities due to respiratory disease has occurred.

In connection with this disability during the early days of illness or accident a serious problem presents itself—the difficulty of recording disabilities of short duration. If an industrial plant is operating 5 days a week an employee can be disabled 2 days without losing any working time. The problem is more serious if the plant operates 4 days or less. I think the time has come when we in industrial medicine should disregard working time lost as a measure of industrial health. The important thing to us as custodians of industrial health is how many days are our patients—the industrial employees—disabled and how many disabilities have they per year. I do not have time to discuss the various means of solving this difficulty of detecting and recording these disabilities of short duration. I can only suggest that the ultimate solution may depend either on payment of benefits for disability of one day or more, as in Dr. Gafafer's group, or upon excellent coöperation of employees and the Industrial Medical Departments.

For several years I have been intensely interested in the problem of recording time lost by industrial workers from disabling sickness and accidents during the early days of disability. For 3 years we recorded on a special card every disability we knew of regardless of whether working time was lost or not. These cards were filed with the employees' records. In a rudimentary way we classified this time lost by departments. It was a good experience

for our later efforts. For the past 2 years, however, in addition to recording all disabilities of any length, even 1 day or more, on an employee's examination card, we have been submitting all disabilities of 3 days or more to statistical study by occupational groups, for the industry as a whole and by cause. The recording of these short disabilities in the records of individual employees gives us important early clues to the employee's health and helps us to forestall longer and more serious disabilities, and thereby materially promotes public health. I will not take your time to explain the various means we have employed to discover these disabilities but, suffice it to say, that we have followed every lead. It has been a severe task, requiring a great deal of clerical help and attention to details. For those who find it difficult to record these disabilities it is suggested that every employee who loses one day or more from work or who is known to have been disabled, even if he lost no time, should be approved by the medical department. We have ceased to record days of disability after the 150th day, which suggests that our statistics for a certain month cannot be completed until 5 months after the last day of that month.

I thought it would show the importance of recording these early days of disability if I compared my results with those of Dr. Gafafer. Table I compares the experience of an iron foundry employing an average of 5,000 people 94 per cent of whom are men, with Dr. Gafafer's figures for *Mcn.* You will note that the number of disabilities and days lost per 1,000 employees from the 3rd to the 7th day inclusive in Dr. Gafafer's group is considerably in excess of that for the foundry. This excess of short disabilities and early days of disability demands an explanation. It can be explained in two ways: (1) that we have

TABLE I
Annual Number of Absences per 1,000 Employees

Days of Disability After Onset	Grey Iron Foundry—94% Males		Public Utility (Dr. Gafafer's Figures)	
	Daily	Cumulative Days of Disability	Daily	Cumulative Days of Disability
1st	?		900.0	900.0
2nd	?		695.3	1,595.3
3rd	376.6	1,129.8	543.2	2,138.5
4th	325.8	1,301.0	415.4	2,553.9
5th	283.0	1,426.0	329.4	2,883.3
6th	258.0	1,786.0	262.1	3,145.4
7th	198.0	1,912.0	205.6	3,351.0
150th		5,770.0	(To 372nd day) 2.2	7,518.2

Days Lost per M per Year—

Dr. Gafafer's Figures	7,518.2	(Public Utility)
Dr. Mudd's Figures (Omitting 1 & 2 day disability).....	5,770.0	(Iron Foundry)
Unaccounted difference	1,748 days per 1,000 men or 8,741 days per 5,000 men	

Since this difference of 8,150 days can be accounted for in most part by the failure to include 1 and 2 day disabilities in the statistics, it is quite fair to distribute them in the same way as are the 3 day disabilities, namely:

Respiratory (inc. N. & T.).....	53% or 4,633 days per year
Gastrointestinal	9% or 787 " " "
Non-Industrial Accidents	3% or 262 " " "
Industrial Accidents	0% or 0 " " "
Non-Resp. Non-Digestive	35% or 3,059 " " "

not kept a record of disabilities of 2 days or less, and (2) our method of discovering disabilities of 3 to 7 days in length have been faulty due to the uneven and sometimes short work week. Also when employees discover that their disabilities are being recorded they occasionally give a false reason for their absence. You will note that the unaccounted difference in days lost per 1,000 per year is 1,748, which closely approximates the 1,595.3 days per 1,000 which Dr. Gafafer found that his group lost during the first 2 days of disability. We thought we were doing a good job but this comparison suggests that our failure to record disabilities of 2 days or less means a statistical loss of at least 23 per cent of the total days lost by industrial workers. It may be that this 23 per cent will prove to be of vast importance in determining the healthiness

or otherwise of an industry. In this group of 5,000 foundry employees, the failure to keep records of disabilities of 2 days or less, when compared with Dr. Gafafer's group, means that 8,741 days per year at least are unrecorded. I will show that this figure is probably greater. When this is broken down into broad causative groups of respiratory, gastrointestinal, non-respiratory, non-digestive and accidents, the results are more significant. If in a foundry where the study of respiratory diseases is so important we are failing to record 4,633 days of disability per year due to respiratory diseases occurring in a group of 5,000 it would seem to be a serious statistical loss. It may be important to determine where in the foundry these 4,633 days of disability were distributed.

So far I have assumed that foundry

work is as healthful as in a public utility, and that we have been able to record most disabilities of 3 to 7 days' duration. But if we assume that there is a proportion between the number of disabilities lasting more than 7 days and those lasting 7 days or less, then we would have to revise our figures. If we are fair in making this assumption, then the 195 disabilities per 1,000 of 3 to 7 days in length occurring in our foundry would become 462 per 1,000 to correspond with Dr. Gafafer's findings of 390.1 per 1,000 disabilities of 3 to 7 days in length, and 153.1 per

1,000 of 8 days or more. Carrying this analogy further it is found that we should expect 419 disabilities per 1,000 (2,095 disabilities among 5,000 men) lasting 2 days or less in our foundry, and if this all be true the importance of recording these short disabilities is all the more evident since our estimated difference of 8,741 days lost per 5,000 men per year during the first 2 days of disability becomes an estimated 9,803 days per year which we have failed to record by not listing disabilities of 2 days or less.

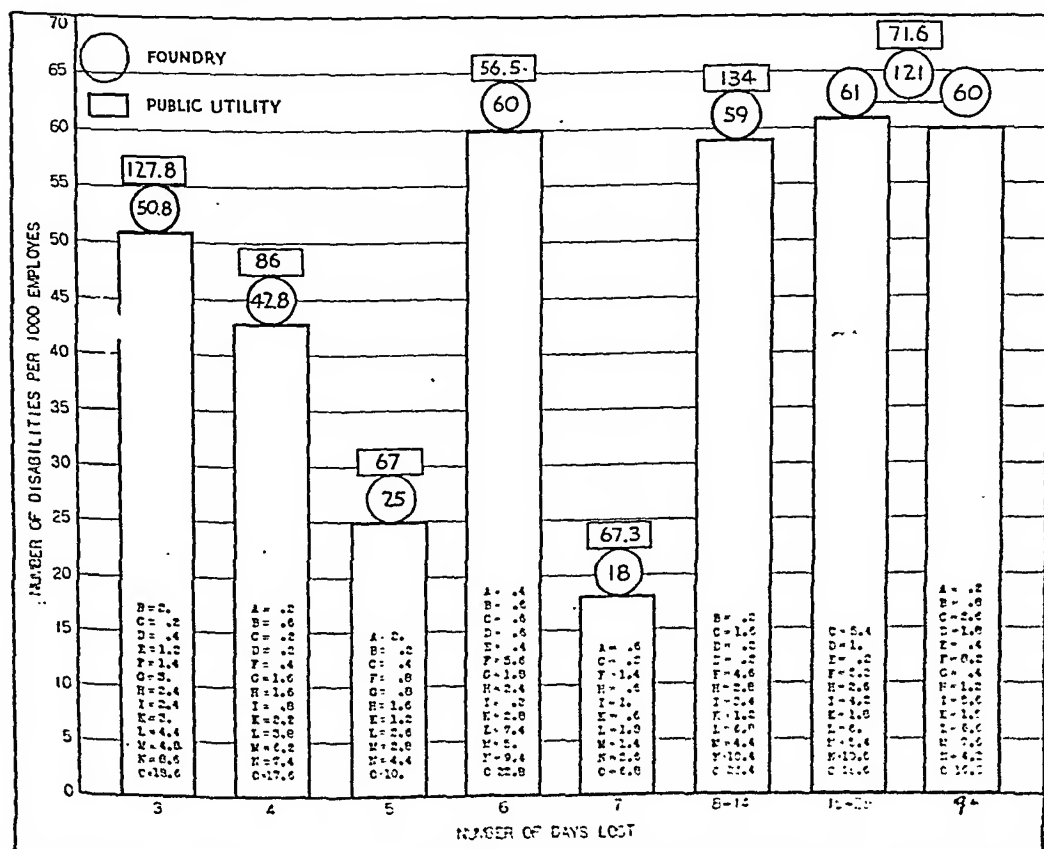
Table II is shown to display in more

TABLE II

NUMBER OF ABSENCES PER THOUSAND EMPLOYEES BY LENGTH OF DISABILITY AND CAUSE

A=Ind. Acc. B=Heat & Cold
C=Contagious Diseases D=Cardio Vascular E=Cerebro Spinal
F=Accidents - Non-Industrial
G=Dental H=Skin I=Genito Urinary K=Miscellaneous
L=Joints M=G.I. N=E.E.N.&T
O=Respiratory (Results if not noted are zero)

TOTAL NUMBER OF DISABILITIES	1877	PER M. 377
NUMBER LOSING 7 DAYS OR LESS (1 and 2 day disabilities not counted)	986	193
NUMBER LOSING 8 DAYS OR MORE	891	178



graphic form the difficulties encountered in recording short term disabilities where there is neither incentive nor necessity for employees to report them exactly. You saw that Dr. Gafafer's curve of the annual number of absences per 1,000 persons is more or less definitely parabolic whereas the curve for our industry where a real effort has been made to record all disabilities of 3 days or more is found to be absolutely irregular. This is best seen in the unexpected drops in the number of 5 and 7 day disabilities. This might be explained by the tendency on the part of employees to consider a week to be 6 days, omitting Sunday, or where the work week was 4 days to consider oneself to be disabled 4 days instead of 5. And so without an adequate incentive such as payment of benefits for every day of disability it would seem impossible to arrive at an accu-

rate figure of the days lost per 1,000 per year, during the early periods of disabilities. In this table for sake of completeness I have included under each group of disabilities the various causes of these disabilities. Dr. Gafafer's group lost $7\frac{1}{2}$ days per man per year, whereas our foundry group is charged with but 5.8 days per man per year and we thought we had recorded most disabilities of 3 days or more. No one figure can more adequately express the need of recording those earliest days of disability and particularly the first and second days.

Dr. Gafafer has thrown open the doors to a field of industrial medical research which may prove of vast importance in the determination of industrial health. Years of study of this problem will be necessary before the answers to many questions which now present themselves can be obtained.

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THE ORAL HEALTH GROUP

ANNOUNCEMENT was made in the *Journal* shortly after the meeting of the Association in New York in 1937 regarding the formation within the Association of the Oral Health Group. This informal association had among its objectives the fostering of an interest in dental matters throughout the various Sections. The first year's activities of this group culminated in the appearance of several notable papers on dental problems at Kansas City, a successful Oral Health luncheon, and the presentation of a symposium on "How to Improve Dental Health in the United States," jointly sponsored by the Public Health Education and the Child Hygiene Sections.

Three of the papers read in the symposium appear in this issue. They present points of view which should engage the attention of all who come in contact, as what public worker does not, with dental disease in any of its various manifestations. When one considers the undoubted deleterious influence of dental infection on general health, the progressive nature of dental disease when neglected, and its practically universal incidence, it is only natural that this subject should receive increased attention.

Professor Turner's paper outlines an effective approach to the community dental program through health education. Dr. Cady gives major consideration to the dental service problem. Dean Millberry's paper makes a direct approach to the economic problem involved in providing dental care and deals with two of the outstanding items contributing to the cost of dental service, the cost of dental equipment and the cost of dental education. Believing that dental equipment, practicable at least for children's dental care, can be manufactured through mass production methods at much less than current prices, he proposes also the reduction of cost of dental education through a curtailed course of instruction designed to prepare dental practitioners trained to give preventive and corrective dental care to children only, under the jurisdiction of the health department or board of education. The course would consist of two years of

predental college work and two years of training in the dental school. This is a somewhat revolutionary concept and demands careful consideration, especially as it has not had a hearing before either the American Dental Association or the American Association of Dental Schools.

Dean Millberry's plan was based on a program proposed by him at the University of California in 1925, adopted by the Academic Senate, and approved by the Board of Regents. Basically, it provided for the education of persons who would pursue professional studies for four years after completing high school, at which time a Bachelor of Science in Dentistry would be awarded. Millberry believes that such persons would be qualified to perform the simpler types of dental operations which constitute about 80 per cent of the practice of the average dentist. Some of these students might go on with further studies to be recognized with higher degrees. When proposed in California, dentists who felt that the Doctor's degree in Dentistry was a requisite for practice protested violently, and the plan was abandoned.

Dean Millberry calls attention to the fact that in New Zealand a similar type of training has been given to young women after two years of dental training only, with no prerequisite college work, and who serve the children in the public schools. He claims that even with this shorter period of study the program is successful and that it is so regarded by the dentists in New Zealand.

The dentist members at Kansas City took issue with Dean Millberry's proposal, believing that dental disease in American children is becoming more complex in its manifestations and that, in consequence, operators could not be trained in two years in the dental school to cope with the diagnostic and operative problems involved. Attention was also called to the dangers under such a plan of illegal practice by those licensed to practise in a restricted field. Altogether, they felt that it would be quite unacceptable to the American Dental Association and to dentists generally throughout the country.

There can be no doubt that the cost of dental treatment is high and that the funds for providing it on a community basis are all too small. Any relief, such as that offered by Millberry, will seem welcome to public health administrators, most of whom have little knowledge of the technical problems involved. Over against this group will be the mass of dentists who will probably prejudice this proposal on its departure from the *status quo* without inquiry into its possibilities. Without taking a stand for or against the Millberry plan, it at least seems proper to suggest its consideration by a group of dentists thoroughly familiar with the problems involved in giving dental care to American children. A critical evaluation of the New Zealand method seems desirable also, particularly with regard to its applicability to North America.

An important consideration is the ultimate effect which such a project would have on the standards of dental practice. Would it be in the public interest to endorse a scheme which would make dental or medical practice less attractive to our best qualified men and women and thus bring into the professions a group having inferior qualifications?

There is a more fundamental need than that which Dean Millberry's plan is intended to meet, namely, the need for reducing dental disease which is so much on the increase and which even now calls for so vast an amount of treatment services. Even the savings which are envisioned in the Millberry plan would hardly make possible the control of all the dental caries known to

exist in the mouths of the nation's children. Even more than the financial relief which Dean Millberry would afford us, we need a broad and inclusive research to determine how dental decay can be prevented and a dental health education program which will put the findings of that research to work. These aims would seem readily attainable and thoroughly practical, and should be effectuated as early as possible in order that the nation may promptly benefit from the services now enjoyed only by the few.

PROFESSIONAL LEADERSHIP IN THE SCHOOL HEALTH PROGRAM

THERE can be no doubt that school health programs are ready to share in the expansion that is now affecting all public health enterprises. It has been said that leaders arise in response to needs. Where shall we find the leadership to advance this important phase of health work? How can the American Public Health Association assist in its development?

Competent professional leaders, capable of investing school health work with a sound philosophy and of giving it practical direction, are not wanting in the American Public Health Association but they are scattered through many of the Association's Sections. This is only natural because a variety of special interests is inherent in school health programs. What Association facility can implement the needed leadership?

It was with such questions in mind that representatives of the American School Health Association met with the Section Council of the Child Hygiene Section of the A.P.H.A. at the Kansas City Meeting, and proposed that the two associations join hands in an effort to mobilize their findings for the guidance of those in school health work.

Members of the Child Hygiene Section recognize that the scientific sessions in which the American School Health Association has participated have already served to unite many special groups in the interest of better school health programs. The Child Hygiene Section has a continuing concern with the child of school age, but accepts the American School Health Association as an agency specially focused on school health program policies, procedures and organization.

Believing that we should achieve some formal recognition of an informal relationship that has extended now over twelve years, a movement is under way which will place the American School Health Association in the position of an associated organization of the American Public Health Association. Such a plan has been approved in principle by the Committee on Constitution and By-laws of the A.P.H.A., and the Executive Board has authorized that this suggestion be brought to the attention of the Governing Council of the next Annual Meeting in the belief that some such recognition should be approved.

The key to the solution of school health problems lies in teamwork between the professions of education and public health. On the side of the educator developments have been rapid since June, 1937, when the American Association for Health, Physical Education and Recreation was organized as a department of the National Education Association. In November, 1938, a conference was held in New York City which was attended by many agencies with interests in the health education approach through the schools, and the A.P.H.A. has

accepted membership on the Board which will undertake the coördination of these programs between health and educational groups. Professor Ira V. Hiscock of the Yale Medical School has been designated as the Association representative.

Confidence in the belief that a good foundation has been laid for coöperative understanding in this field, and that special interests must give way to coöperative action, the future of these relationships seems encouragingly clear.

LIABILITY FOR WATER-BORNE DISEASE

IT is now a well established principle of law that a purveyor of water for human consumption, whether a private water company or a municipal corporation, will be liable for damages to consumers who contract diseases from the water as a direct result of negligence on the part of the purveyor.¹ While not an insurer or guarantor of the purity and potability of the water, a municipal or private corporation has the duty of ascertaining the quality of its water supply, and it must take all necessary precautions to safeguard the health and welfare of those who use the water. Failure to discharge this responsibility creates a legal wrong.

In view of the numerous outbreaks of water-borne disease that have occurred in this country and abroad, and in view of the many court decisions upholding awards of substantial money damages to persons injured by contaminated water, this legal doctrine ought to be familiar to all water works officials. Too many public and private vendors of domestic water supplies seem unable, however, to learn the bitter lesson of experience.

In 1878, for example, there occurred at Caterham and Redhill in England an epidemic of typhoid fever, caused by pollution of a public well by a workman who was a carrier of typhoid fever.² Here was a salutary lesson, and yet 60 years later history repeated itself.

Late in 1937 and in 1938 Croydon, England, was visited by a disastrous epidemic of typhoid fever, upon which we commented editorially last May.³ According to more recent reports in British medical publications,⁴ this preventable outbreak was responsible for 322 primary and 19 secondary cases of typhoid, with 43 deaths. This unnecessary slaughter was due to contamination of a public well by a workman who was a typhoid carrier.

Since the corporation had negligently omitted the customary filtration and chlorination of the water supply while the workmen were engaged in their operations, this London suburb is reported as now being confronted with claims for damages for this epidemic amounting to more than £100,000, or nearly half a million dollars. Carelessness in community health protection apparently does not pay.

In a lawsuit brought against the corporation by a father whose daughter suffered a dangerous illness in this outbreak, an award of £400 damages is said to have been made by the English High Court. The corporation, apparently realizing the hopelessness of reversing this decision, is reported as having decided not to appeal.

The court made its adjudication mainly on the matter of negligence. Since the father and not the daughter had a contractual relationship with the corporation under existing statutes, there was no breach of warranty in the case of

the daughter. There was, however, the right of redress at common law for negligence, and this was adequate to justify the award upon proof of the fault of the corporation.

The American courts have taken the same position in a long line of decisions.⁵ In 1928, for instance, an award of \$2,000 to a minor and \$1,000 to his father was sustained by the highest court in New York in a case where typhoid fever had been contracted from a city water supply which had been contaminated by sewage from an old canal.⁶

Despite unfortunate experiences such as this, an epidemic of water-borne typhoid occurred in Olean, N. Y., in 1928, and resulted in the payment of claims by the city amounting to more than \$400,000.⁷ We repeat that negligence in performing an important public health duty, such as the maintenance of the purity of a domestic water supply, is a costly mistake.

Sanitarians, municipal authorities, and water works officials should take keen cognizance of their legal responsibilities, and should carefully consider the legal liabilities of public and private corporations in performing such proprietary functions as dispensing water and disposing of sewage. Prevention of disease in such instances not only is a necessary humanitarian duty, but it is an economic safeguard of vast significance. The maxim that ignorance of the law is no excuse is not yet obsolete.

REFERENCES

1. Tobey, J. A. *Public Health Law*. 2nd ed. The Commonwealth Fund, New York, 1939 (in press).
2. Stallybrass, C. O. *The Principles of Epidemiology*. Macmillan, 1931, p. 353.
3. *A.J.P.H.*, 28:644 (May), 1938.
4. Liability of a Sanitary Authority. *Lancet*, Dec. 10, 1938, p. 1366.
The Croydon Test Case. *Pub. Health*, 52:95 (Jan.), 1939.
5. Tobey, J. A., *op. cit.*
6. *Wiesner v. City of Albany* (1928), 229 N.Y.S. 622, 224 App. Div. 239. affirm. in 250 N.Y. 551, 166 N.E. 320.
7. *A.J.P.H.*, 21:390 (Apr.), 1931.

EDUCATING FUTURE ENGINEERS

IN a recent issue of the *Public Health Reports*, there appeared an article summarizing the results of a study of 4 year undergraduate college courses available during the academic year of 1936-1937 for students wishing to follow sanitary engineering work or engage in public health engineering activities. Under six main divisions and fifty sub-divisions, the curricula of twenty-six courses in sanitary or public health engineering were broken down so as to show the per cent of time allotted to the subject matter described by the sub-division titles. Two of the main divisions were sanitary engineering and public health. Some of the material in this article merits more analysis than was given to it, even though such a study results only in the statement of certain questions for which answers are not immediately forthcoming.

Using sanitary engineering and public health subjects as a yardstick, the figures in one table show that the percentage of time allotted to these two broad classifications range from 24.8 to 4.6 of the total, and, if the highest figure is excluded as not being entirely comparable to the others because it pertains to a course definitely designed for public health engineering training, the range is from 20.4 to 4.6. The average time-allotted figure for these lower twenty-five

courses is 11.3 and fifteen courses are found to devote lesser amounts of time to the two subjects under consideration than this average. In the case of two colleges, their courses include less time on these important subjects than is devoted to the same studies—on the average—by forty-five colleges which make no pretense of offering training for work in this field. If a generous allowance is made for differences of opinion as to what should be included in such courses, it would seem that this spread in the time-allotted figures is too great and that some of the courses are not providing the material to the students which the future field of activity demands.

Is there need for a sharper line of demarcation between training courses for the undergraduate sanitary engineer—the designer, builder, seller, and operator of sanitary works—and the public health engineer—the designer, builder and seller of public health engineering? If so, there is likewise need for more and better educational opportunities for those wishing to confine their life work to the public service of health improvement and protection. On the other hand, should the engineer first be trained in basic engineering knowledge and then have superimposed on that additional work emphasizing public health as a specialty? Neither of these questions can be answered today, but if both sanitary and public health engineering graduates are to go into the field of public service after only 4 years of undergraduate work, there is need for many curricula to be recast in the light of the present scope of environmental sanitation work.

PUBLIC HEALTH EDUCATION*

How to Write Badly—By Our Own Cliché Expert. "Being in a cynical mood this afternoon," writes our Cliché Expert from Boston, "I have to disgorge myself of something that has been eating at my vitals for some time."

A hurried review of the season's morbidity reports should be termed "an intensive epidemiologic study."

Any health project that is undertaken in three or more communities becomes known as "a nation-wide campaign"; or, a-la-Kipling, "far flung."

If some prominent people are met in the day's work, be sure to report that "the key people were contacted"—thus killing two (cliché) birds with one stone, if we may coin a phrase here.

A brief publicity project may be cursed effectively by having it designated a "drive" or better an "intensive educational campaign."

If a committee is asked to meet, do not fail to extoll the virtues of "group thinking": it makes for clarity when a verb is tortured to create a doubtful noun.

When the help of others is needed, it must be emphasized that nothing short of "100% coöperation will do." Another convincing expression is "about 75%," for the symbol of an exact determination qualified by an approximation becomes pleasantly obscure.

No scientific paper is complete without some reference to the "average man," or "normal health," however meaningless the expressions may prove.

Scientific jargon impresses the lay reader even if he does not understand it, so use "optional nutritional status," "case fatality rates," or "upper respiratory infection," whenever simpler terms would do.

Who Wrote This Letter?—Many letters leave a bad taste because the signature is hard to read. You may have noted a new style in business let-

ters, which has been urged by *The Reporter*, 17 E. 42nd St., New York, N. Y. In place of the double set of initials at the lower left corner of the letter, the full name of the dictator appears, such as,

Henry E. Smith:MBS

Others who wish to increase signature readability and acceptability may well take up the long accepted but not always used fashion, having the full name typewritten below the pen written signature.

Anyway let's take the puzzle out of the signature.

Why Not Two Copies?—A subscriber to *The Reporter*, direct mail advertising journal, wishes that the magazine was printed on one side of the page for clipping and filing.

A better plan would be to subscribe for two copies. Files of magazines have serious limitations for reference use. Two copies of the *Journal* would enable a health agency to cut freely and file articles which would make up a splendid reference collection.

Add two copies of *Hygeia* for popular material, and the health educator would have an unexcelled reference library.

March of Health Broadcasts in Illinois—From Radio Speaker Leona de Mare East, Illinois Department of Public Health, we have this helpful outline of procedure:

The topics of the weekly broadcasts are selected from 13 to 26 weeks in advance by the Division of Public Health Instruction. The educational material is interwoven into as dramatic a 15-minute radio play as possible by the staff radio speaker. Each play is

* Please address questions, samples of printed matter, criticism of anything which appears herein, etc., to Evart G. Routzahn, 130 East 22nd St., New York, N. Y.

approved in the Instruction Division and mimeographed. Before being produced it is checked by staff physicians, nurses, engineers, or bacteriologists, according to the field in which the subject falls. The aim is to present accurate and stimulating health information in a form that has enough listener-interest to compete with commercial radio shows. Actors with professional experience are recruited both from the department's staff and from local dramatic groups. The electrical recordings are produced in a commercial studio under the direction of the author. From the original master transcription 18 copies are made for shipment to the 18 cooperating radio stations. This gives the Department a total of $4\frac{1}{2}$ hours of air time a week, covering the rural as well as the urban areas of the state. A gratifying response has followed the occasional offers of health pamphlets on these broadcasts.

The station schedule appeared in *Illinois Health Messenger*, Springfield, for Dec. 1, 1938. Miss East will supply copies of the broadcasts, and will welcome suggestions or criticisms.

Making It Easy for Visitors—
The Altro Workshops, conducted by the Committee for Care of Jewish Tuberculous, 71 West 47th Street, New York, N. Y., is located in a faraway spot unfamiliar to most of those who would attend even a 25th anniversary. So with the invitations was enclosed a slip $3\frac{1}{2} \times 5\frac{1}{2}$ inches which is reproduced on this page. Probably other agencies have used a simple map to encourage visitors, for a special occasion or throughout the year. A few social agencies use interesting picture maps.

"Make a Note of It"—This title of a plea for note-taking is developed in *Rotarian*, 35 E. Wacker Drive, Chicago, Ill. Jan., 1939. 25 cents.

It tells why we should make more of an effort to tie down fugitive thoughts and observations, what we read and

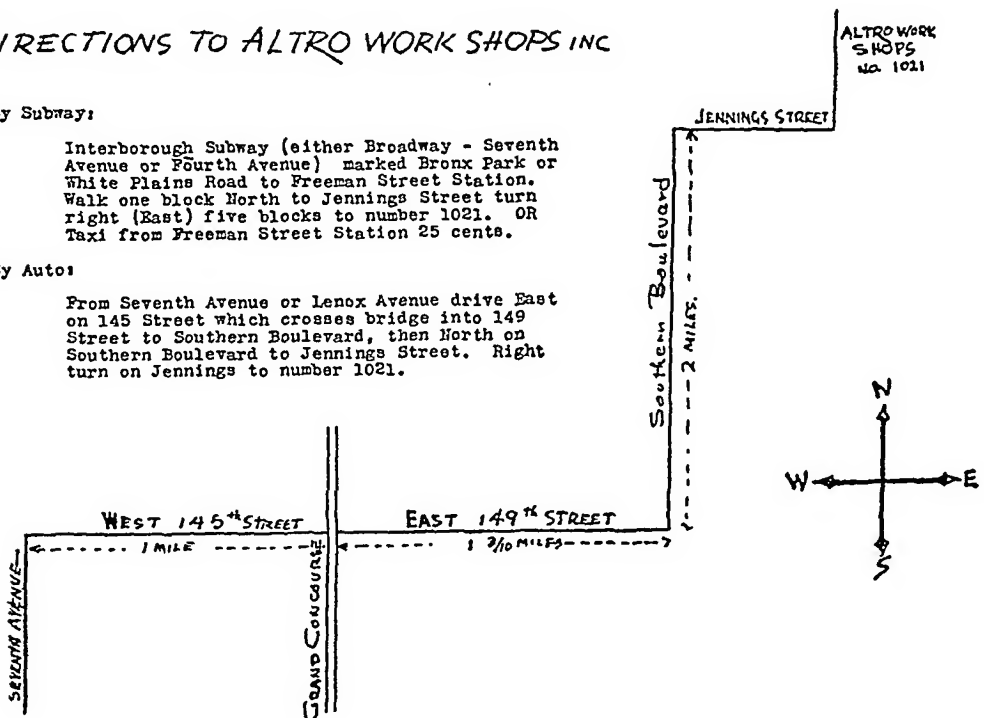
DIRECTIONS TO ALTRO WORK SHOPS INC

By Subway:

Interborough Subway (either Broadway - Seventh Avenue or Fourth Avenue) marked Bronx Park or White Plains Road to Freeman Street Station. Walk one block North to Jennings Street turn right (East) five blocks to number 1021. OR Taxi from Freeman Street Station 25 cents.

By Auto:

From Seventh Avenue or Lenox Avenue drive East on 145 Street which crosses bridge into 149 Street to Southern Boulevard, then North on Southern Boulevard to Jennings Street. Right turn on Jennings to number 1021.



what we see. Darwin, Edwards, Stevenson, and others testify.

One application:

Try keeping a pad handy to record unusual or half-forgotten words you meet during the course of the day—not necessarily big or out-of-the-way words, but words that strike you as having tang in some connection. It is a simple matter to run over the list at night, and with a decent filing system it is possible not merely to enlarge your vocabulary, but also to add considerably to the interest of your talk and thinking.

A Safety Education Workshop—Ben W. Miller, Director of Driver Research, Indiana University, Bloomington, reports on a Safety Education Workshop in the Student Building:

This Safety Education Workshop was set up in early spring to accommodate our undergraduate and graduate students who are enrolled in Health and Physical Education courses. In it, we had more than 600 different pieces of materials on display, and available for use were twenty $3\frac{1}{2} \times 12$ tables. We had posters on all phases of health and safety on display, and also displayed anatomical charts and models, and other teaching materials, such as the marihuana weed and testing devices. Our materials in Safety Education were grouped according to 4 major headings: Recreational; Transportation; Occupational; and Home and School. This Workshop was used for our elementary teacher training group, our major students in Health and Physical Education, and for all of our graduate students, including special seminars in health and safety. It proved to be quite a popular gathering place for students, and it met with such success that we have asked for special appropriations in our budget to add to the facilities and materials we already have. Another feature of the past summer was the use of this Workshop by the 90 recruits who were being trained by the Indiana State Police. They completed special requirements in the classroom as well as on the road in traffic safety.

Publication by Microfilm—A new medium for the distribution of scientific material is made practicable through University Microfilms, 313 N. 1st St., Ann Arbor, Mich.

Briefly a monograph or dissertation will be photographed from typewritten

manuscript on microfilm. Prints will be supplied at $1\frac{1}{4}$ cents a page. Reading machines are now available in many universities and elsewhere, and low cost machines are near at hand. The service is available to those possessing a doctorate degree or those having a doctorate dissertation for publication. Those interested will receive much additional information upon request.

Wholesale Discussion in Pittsburgh—In October, 1938, the National Recreation Congress (315 4th Ave., New York, N. Y.) included 5 simultaneous discussion groups every afternoon.

Long in advance a 22 page pamphlet, "Topics for Group Discussion," was distributed to the expected delegates.

This pamphlet was made up of 24 sets of questions, one set for each of the discussion periods. We quote the questions under "The Interpretation—A Clinic on Written Reports":

1. What are the criteria by which a report should be judged? (i.e. What makes a report "good"?)
 - (a) What are the physical features that need to be considered, size, paper, etc.?
 - (b) How does the date of publication affect its value?
 - (c) What are the major topics to be considered?
 - (d) How does the length of a report affect its best use?
 - (e) What statistical material should go in and in what form?
 - (f) How can illustrative material be best used? etc., etc.
2. For what constituency is an annual report prepared? How far can it be used to interpret recreation to the public? To what extent does the constituency affect the form and content of the report?
3. How can the annual report data be best related to data of previous years to interpret trends and growth, and how can they be used to forecast future progress?
4. What determines the number of reports to be prepared? How plan for the wisest distribution of reports?
5. What methods have been used to have newspapers use report material affectively?

6. Through what other agencies can the factual material be released to the public in attractive form?
7. What would be the values of establishing national standards for reporting recreation? If desirable, how should it be done?
8. What effect does the popularity of picture magazines have on reporting with photos rather than words?

To make sure that every delegate had an opportunity to present what was on his mind a session on the closing day was devoted to a "Pet Show—A Free for All Exchange of New and Pet Ideas."

Here is a chance for anyone to speak on any topic bearing on any phase of recreation. Parade your pet idea for the benefit of others. Receive new ideas yourself. Speak frankly—state it briefly.

What new ideas have you developed?

What original experiments have been made in your city? With what success?

In what part of your program do you take greatest pride?

If you had unlimited funds, what are the first three things you would do to serve the recreation needs of your city?

What seemingly desirable steps have you tried without success?

This use of discussion was not experimental. For years the National Recreation Congress has been notable for giving considerable time to open discussion. Thus a wealth of practical experience has been made accessible to all. Moreover, careless thinking and half-baked ideas have been brought out into the open.

May there be generous time allotment for discussion when the A.P.H.A. meets in Pittsburgh in 1939.

NEW

Our Children's Health, mimeographed bulletin of 22 pages, issued by Division of Public Health Training, New York City Department of Health. For school physicians and nurses.

TO HELP OR BE HELPED

The Health League of Canada (105 Bond St., Toronto) wants a slogan. To

start your thinking, here are samples:

"Health for all is wealth for all" . . .
 "Health for all and all for health" . . .
 "Happy he who holds his health" . . . "Put on the armor of health."

"There's Nothing Wrong With Your Mind!" That is, if "you can't make it work" and make it "stick to the subject," according to H. D. Kitson, Ph.D. For the normal minded who don't think enough or think hard enough. *American Journal of Nursing*, 50 W. 50th St., New York, N. Y. Feb., 1939. 35 cents.

MIMEOGRAPH OR PRINT

If you wish to consider a variety of folds in a novel announcement or invitation . . . or if you are interested in the pleasing effects of a white paper with one side tinted . . . ask Appleton Coated Paper Co., Appleton, Wis., to send portfolio of samples of "dull-chrome" paper, and tell you where to buy it.

Ready-made illustrations for inserting, as is, and quite simply, in the stencil which has been typewritten with space left for the illustration, are provided by Milo Harding Co., 613 Commonwealth Annex, Pittsburgh, Pa. An instruction sheet, and proof sheets at intervals, will be sent upon request. You order the sheet you want, and when you want it. This service makes it possible to use timely illustrations in any bulletin or other mimeographed job. If you don't fully understand the idea, please write the Editor.

MOTION PICTURES

The National Tuberculosis Association has recently released "On the Firing Line." In sound on 16mm. and 35mm.

Accompanied by crisp, running narrative, the film takes the audience to various points of interest including Trudeau Sanatorium, Waverly Hills Sanatorium, the bayou country in Louisiana, the University of Minne-

sota, and the southwest. There are scenes showing the public health nurse on her rounds, the research laboratory, industrial workers, Negroes, and so on. Animated isotype graphs (picture diagrams produced by Dr. Neurath) present the statistical facts.

MAGAZINE ARTICLES

"Sulfanilamide," by J. Pfeiffer. *Harpers*, 49 E. 33rd St., New York, N. Y. March, 1939. 40 cents. "The story of a great discovery."

"Sleep and Insomnia," by G. W. Gray. *Harpers*. Nov., 1938. First of a new series of medical articles.

DATES AHEAD

Early Diagnosis Campaign, April 1-30. See any tuberculosis association.

Silver Anniversary Observance of National Negro Health Week, April 1-30, 1939. Address: National Negro Health Week Committee, U. S. Public Health Service, Washington, D. C. The "Week" is April 2-9, but the Anniversary will extend through all of April. Ask for samples of history and plan bulletin, poster, and school poster, and information about the poster contest and the awards for successful local observance of the event.

"Boys and Girls Week," April 29-May 6, includes "Health Day," May 1. Address: National Boys and Girls

Week Committee, Room 950, 35 E. Wacker Drive, Chicago, Ill.

"May Day—Child Health Day," May 1. Slogan: "The Health of the child is the power of the nation." Address: U. S. Children's Bureau, or your own State Committee. Children's Bureau has issued a new May Day poster, 30 x 34 inches. 20 cents. Quantity discounts. Order from Superintendent of Documents, Washington, D. C. Write the Bureau for new series of May Day leaflets.

"National Hospital Day," May 12, 1939. Address: Albert G. Hahn, Chairman, National Hospital Day, Deaconess Hospital, Evansville, Ind. Also, Physicians' Record Co., 161 W. Harrison St., Chicago, Ill. See plans for the day under "Public Education" in "Hospital Organization and Management," by Dr. M. T. MacEachern.

Both the San Francisco and New York expositions have announced May 12 as "Hospital Day."

Annual Meeting of National Tuberculosis Assn., Boston, June 26-29, will include health education topics.

Interpreting Modern Methods of Tuberculosis Control to the Public . . . Negro Health Education . . . Tools of Health Education (including printed word, visual education, spoken word) . . . Junior High School Health Education . . . Public Relations (in National Conference of Tuberculosis Secretaries).

BOOKS AND REPORTS

Books of Special Interest to Public Health Workers

MAZÏCK P. RAVENEL, M.D.

"Of making many books there is no end; and much study is a weariness of the flesh." So saith The Preacher, so we are here making an attempt to lighten the burden of our readers in this respect.

An interesting function of the Editorial Office is the examination of new books and a report of them to our readers. We limit our published reviews almost entirely to those which are devoted to the consideration of matters treating directly of any of the various concerns of public health and personal hygiene, though a considerable number of other books are gone over.

It has seemed helpful at the end of each year to scan the reviews published in our own *Journal* as well as a number of others, and select from them those which we believe to have special interest and usefulness to the constantly increasing numbers engaging in the many fields of public health who do not have access to the large number of new publications, copies of which the publishers are courteous enough to furnish to us.

As has been our custom in the past, we depend most on the reviews in our own *Journal*, but consult a number of others, chiefly the *Journal of the American Medical Association*, the *British Medical Journal*, and *The Lancet*. The brief opinions expressed are taken from the original reviews, often in the exact words, though quotation marks are not used.

Publishers have shown as much interest in our endeavor as our readers

have, and to them we express our appreciation of their liberality and courtesy.

This year we include only books of which the reviews have appeared during the nine months of 1938, May to December, inclusive.

CHILD HYGIENE

As usual, for a number of years past child hygiene has received a great deal of attention, but again, while there have been a number of articles, not many books on the subject have come to hand. *The Compleat Pediatrician: Practical, Diagnostic, Therapeutic and Preventive Pediatrics*, by Wilbur C. Davidson, Duke University Press, 2nd rewritten edition, is a valuable compendium of pediatric materials prepared as a ready reference for practitioners of medicine especially interested in pediatrics. *Modern Ways With Babies*, by Elizabeth B. Hurlock, Lippincott, is readable and comprehensive and is an excellent common sense aid to the intelligent mother.

HEALTH EDUCATION

There is growing interest in the matter of health education, especially in the early years. In addition to various reports and discussions, the following books seem to be of especial interest: *How To Be a Convincing Talker*, 2 vols., by J. George Frederick, Business Bourse, is recommended by the reviewer as "usable by many *Journal* readers." It is a valuable exposition of the im-

portance of good language and of public speaking. *Integration, Its Meaning and Application*, by L. Thomas Hopkins and others, Appleton-Century, is an excellent and interesting volume for those engaged in health education.

HISTORY AND AUTOBIOGRAPHY

There is a distinct trend on the part of physicians to write histories of all kinds. Several excellent autobiographies have appeared which are interesting not only as lives of the individuals concerned, but especially so because they tell much of the medical customs and practices of their times. Perhaps the most popular of these is *The Horse and Buggy Doctor*, by Arthur E. Hertzler, Harpers, which is a best seller. *More of My Life*, by Andrea Majocchi, Knight Publishers, is a fitting sequence to *Life and Death*. Among the many autobiographies by doctors which have appeared during the last few years, this stands easily at the top. It is a human document of intense interest. *Fifty Years a Country Doctor*, by William N. Macartney, Dutton, is a most interesting autobiographical volume which boosts the country doctor and holds that he is not only important to the world but will continue to maintain his place. *Not So Long Ago—A Chronicle of Medicine and Doctors in Colonial Philadelphia*, by Cecil K. Drinker, Oxford University Press, is a contribution to colonial history as well as to medical history of that period which has excited approbation everywhere. It concerns particularly Philadelphia and Pennsylvania. *Public Health and Medical Licensure in the State of Mississippi, 1798-1937*, by Felix J. Underwood and R. N. Whitfield, Mississippi State Board of Health, is excellent as history and as an example. *The Conquest of Cholera, America's Greatest Scourge*, by J. S. Chambers, Macmillan, is a most interesting and valuable account of

cholera in the United States from its first appearance (1832) and its conquest in 1892. *Milestones in Medicine*, Introduction by James Alexander Miller, Appleton-Century, is made up of the "laity lectures of the New York Academy of Medicine" and is excellent as helping the public to understand the medical profession.

INDUSTRIAL HYGIENE

There have been innumerable articles and reports on industrial hygiene. There is constant increase in the number of chemicals and processes entering into manufacture and the industrial occupations, but few books have come to our notice. *Toxicology*, by William D. McNally, Industrial Medicine, a book of more than 1,000 pages, is a leader in industrial toxicological field and is indispensable to those interested in toxicology and its medicolegal aspects. *Fluorine Intoxication*, by Kaj Roholm, H. K. Lewis and Co. Ltd., is especially recommended for those interested in any of the various phases of fluorine intoxication. *Third Symposium on Silicosis (Saranac Lake)*, edited by B. E. Kuechle, Employers' Mutual Liability Insurance Co., is the third annual symposium by noted students of this most important disease, which still presents many problems. There is nothing better of its kind in existence. *Carbon Monoxide Asphyxia*, by Cecil K. Drinker, Oxford Medical Publications, is a comprehensive and critical review by an authority of long experience. *Occupation and Health*, Supplement, International Labour Office (U. S. Branch, Washington) is written by outstanding authorities, mostly European. It is appearing in the form of brochures, 16 of which were issued in 1938. Highly valuable. From the same source comes *Workmen's Compensation for Silicosis*, giving summaries of the legal phases of the question throughout the world. These

supplement the Symposium from Saranac. Available in this country in 1938 though issued in 1937, is *Toxicology of Industrial Solvents*, compiled by the Industrial Research Board of the Medical Research Council of England, H. M. Stationery Office, which is indispensable to all working in this field. Closely related to the problems of the industrial hygienist are *Medical Jurisprudence and Toxicology*, by John Glaister, of which the 5th Edition was issued by Wood during the year, and *Medical and Legal Aspects of Tuberculosis as an Occupational Disease and as an Industrial Injury*, by Mary Graham Mack, National Tuberculosis Association.

LABORATORY

Outstanding among strictly laboratory books are *The Laboratory Diagnosis of Syphilis*, by Harry Eagle, Mosby. This is a very valuable study of a matter of vast importance which will command the respect of all readers. *A Textbook of Hematology*, by William Magner, Blakiston, is an excellent book which merits a high degree of popularity among technicians and practitioners of medicine. Among new editions is the second edition of *Approved Laboratory Technic*, by John Kolmer and Fred Boener, Appleton-Century. This is a well known textbook with 28 collaborators, the first edition of which was well received.

Bacteriology is the foundation of modern public health practices. Parasitology refers to animal parasites and for many years a section on this subject has been included in all textbooks on bacteriology. Consequently we look forward with a great deal of interest to all new books on these subjects. Perhaps the most notable publication of the year has been *The Biology of Pneumococcus*, by Benjamin White, et al., Commonwealth Fund. Giving an extensive bibliography, it is an excel-

lent reference book and readable. In the death of the senior author since this book appeared, the scientific world has suffered a great loss. We know of no study of the pneumococcus in this country which is more complete than this, beginning with the discovery of the germ in 1875. Another outstanding book is *Parasitology: With Special Reference to Man and Domesticated Animals*, by Robert Hegner, Francis M. Root, Donald L. Augustine, and Clay G. Huff, Appleton-Century. Special emphasis is laid on parasites which affect man—one of the best text and reference books in the English language. The second edition of *Bacteriological Atlas*, by Richard Muir, Wood, has been issued. It contains a number of improvements over the first edition, though still ultraconservative as far as nomenclature goes, and is an excellent work. *Dairy Bacteriology*, by B. W. Hammer, Wiley, is a notable second edition of a book which is one of the most authoritative and useful in its field. *A Textbook of General Bacteriology*, by Edwin O. Jordan—Revised by William Burrows, Saunders, is a standard text of many years. The revision is not all that could have been wished, but the book is still standard. *Pneumonia and Serum Therapy*, by Frederick T. Lord and Roderick Heffron, Commonwealth Fund, is the last word on serum therapy of pneumonia and is invaluable to practitioners and health officers. *Bacteriological Metabolism*, by Marjory Stephenson, Longmans. This is a second edition just out in 1938, and is perhaps the best thing on the subject, for general use, at any rate.

MENTAL HYGIENE

During the past year interest in mental hygiene has been very much to the fore. A striking instance was the symposium on mental health at the meeting of the A.A.A.S. Naturally much attention

has been paid to the development of the child along these lines. Among notable books are: *The Psychology of the Unadjusted School Child*, by John J. B. Morgan, Macmillan, a revised edition of a standard book issued in 1924, which is characterized by directness, clarity, and authenticity. It is an excellent practical guide for teachers and parents. *Clinical Psychology: A Handbook of Children's Behavior Problems*, by C. M. Louttit, Harper, is a clear interpretation of carefully collected material and its practical applications. Useful not only to the psychologists but also to medical students or the physician or school administrator seeking to keep abreast of the most recent work in the field of clinical psychology. *The Subnormal Mind*, by Cyril Burt, Oxford University Press, 2nd edition, is a worth while addition to the library of any worker in the broad field of child welfare. *Mental Hygiene for Nurses*, by Elizabeth Lee Vincent, Saunders, has already been mentioned under the heading of Nursing. *Mental Health Through Education*, by W. Carson Ryan, Commonwealth Fund, is of interest to all concerned with the influence of educational programs on the personalities of teachers and pupils and gives added impetus to the movement for a comprehensive, dynamic school program. *Safeguarding Mental Health*, by R. C. McCarthy, Bruce Publishing Co., is a well written book for popular use—parents, teachers, and any others who have to do with training of children. *Child Guidance Procedures: Methods and Techniques Employed at the Institute for Juvenile Research*, Paul B. Schroeder, Director, Appleton-Century, is a notable book which might be put under one of several heads. The dominant idea, however, is child guidance procedures.

NURSING

Public health nursing continues to

hold the interest of all public health workers and, while there have been many discussions, all of them flattering to the part which the public health nurse takes in our social life, few books have appeared. *Personnel Policies in Public Health Nursing*, by Marian G. Randall, Macmillan, should be in the hands of every public health worker. Every chapter is full of meat. *Mental Hygiene for Nurses*, by Elizabeth Lee Vincent, Saunders, is a "must" book for every nursing library. It is a thoroughly excellent and exceedingly useful book. *Jurisprudence for Nurses: Legal Knowledge Bearing Upon Acts and Relationships Involved in the Practice of Nursing*. By Carl Scheffel and Eleanor McGarvah, Lakeside Publishing Co. The second edition of this text has been broadened somewhat to include new material on the legal standards of the nursing profession. *The Hospital Head Nurse*, by Mary Marvin Wayland, meets the great need of those who are particularly concerned with the efficient conduct of the executive aspects of ward nursing and the training of nursing personnel.

NUTRITION

Nutrition continues to hold a high place in the health discussions in every part of the world. Perhaps the vitamins and their influence are more discussed than any other single feature of nutrition, and during the past year the synthesis of vitamins has progressed rapidly and some of them, notably B., have been put on the market for the treatment of disorders of the nerves, arthritis, etc. There has, however, not been a great output of books, though some new editions have appeared. Chief among these is *The Foundations of Nutrition*, by Mary Swartz Rose, Macmillan, 3rd edition, a welcome revision of a widely used textbook of college courses in nutrition. There is none better. As an illustration of the

use of some of the vitamins in medicine we find *Vitamin B₁ (Thiamin) and Its Use in Medicine*, by Robert R. Williams and Tom D. Spies, Macmillan. A valuable contribution to the scientific literature of nutrition and excellent in every respect.

PUBLIC HEALTH ENGINEERING

Manual for Water Works Operators, edited by E. W. Steel, is an excellent exposition of basic information on water works operation, which is a desirable addition to the library of water works departments. *Public Works Engineers' Yearbook, 1938*. Including the Proceedings of the 1937 Public Works Congress held at Atlanta, Ga., October 4-6, 1937, published by the American Public Works Association. In addition to the more detailed discussion of selected problems of current interest to public works officials, this report contains a review and appraisal of events and developments in all phases of public works engineering. *Sanitary Engineering as a Career: A Monograph (from "Careers")*. Published by The Institute for Research Devoted to Vocational Guidance. The profession of sanitary engineering evolved with the discovery that certain microscopic organisms and bacteria are the causes of some of the worst human diseases.

SOCIAL HYGIENE

In our last annual review we gave a section to syphilis. This disease and venereal diseases in general, have been the subject of many articles. Books which have treated of these diseases are often largely sociological and we have classified them this year under social hygiene. *Syphilis, Gonorrhea, and the Public Health*, by Nels A. Nelson and Gladys L. Crain, Macmillan, is written for health officers, physicians, nurses, social workers, and public health workers. It is comprehensive and authoritative and should

be widely read. *Handbook on Social Hygiene*, by W. Bayard Long and Jacob A. Goldberg, Lea & Febiger, is a timely and authoritative symposium of 442 pages, giving technical guidance and basic philosophy in social hygiene.

TUBERCULOSIS

Tuberculosis is still a matter of constant interest in spite of the fact that we have learned so much about it and that our efforts at lessening the scourge have been so successful. *Tuberculosis Among Children and Young Adults*, by J. Arthur Myers, 2nd edition, Thomas, is the second edition of a book which first appeared in 1930 and gained considerable popularity. It has been brought up to date. *Pulmonary Tuberculosis in Practice*, by R. C. Wingfield, Wood, is a most interesting presentation of the subject with some ideas which are not accepted in America. It contains a wealth of information and is profitable to anyone interested in this disease. *The Collapse Therapy of Pulmonary Tuberculosis*, by John Alexander, Thomas, is a very unusual book, excellently illustrated, recommended to all interested in the subject of tuberculosis. This book on treatment is included, since among diseases the proper clinical care of pulmonary tuberculosis particularly is one of the most important measures in prevention.

VITAL STATISTICS

Graphs: How to Make and Use Them, by Herbert Arkin and Raymond R. Colton, Harper. This book should be on bookshelves next to *Statistical Methods* by the same author, Barnes and Noble, publishers. The entire book is written in the simple straightforward style that made *Statistical Methods* so valuable.

GENERAL

There are many books which might very well be classed under several

headings. The term general or miscellaneous is not at all satisfactory, but we use it for want of something better. Many of these books are educational along one line or the other. *Poisons, Potions and Profits: The Antidote to Radio Advertising*, by Peter Morell, Knight Publishers, is a thoroughly documented and devastating exposé of what radio is doing in advertising quack remedies. *Health, Hygiene and Hoocy*, by W. W. Bauer, Bobbs-Merrill, should be in every household. It is an excellent exposition of quackery, ending in an appeal to common sense. *Principles of Medical Statistics*, by A. Bradford Hill, The Lancet, Ltd., is a well balanced, well written book on elementary statistics prepared at the invitation of the Editor of the London *Lancet*. It is written for physicians primarily, but is also excellent for the health worker. *Report on the British Health Services*, by Health Group of PEP, PEP, 16 Queen Anne's Gate, is a notable book presenting a comprehensive picture of the health services of the British Empire with some criticisms and suggestions and is a most useful study. *Diet and High Blood Pressure*, by I. Harris, Longmans Green, is an excellent book for the "normal individual, and not for people suffering from high blood pressure." *Father's Doing Nicely, The Expectant Father's Handbook*, by David Victor, Bobbs Merrill, deserves a wide popularity. In spite of the many jokes which have been made, there is a great deal of reality in what have been called paternity pains. In San Francisco the new hospital has an expectant father's waiting room. Certainly the obstetrician has more trouble with the father than with either the mother or child. *The Sanitary Inspector's Handbook: A Manual for Sanitary*

Inspectors and Other Executive Public Health Officers, 3rd edition, by Henry H. Clay, Lewis, is admirable in every way and its usefulness is not localized by the fact that it was written around British acts, regulations, and by-laws. *Atlas of Skeletal Maturation (Hand)*, by T. Wingate Todd and Associates, Mosby, is an excellent study giving a basis upon which better standards may be created, but is too technical for general use. *Allergy: Its Practical Application*, by J. A. Rudolph, Dorrance, is a specialty which considers much more than making skin tests. There is a useful chapter on Immunology of Allergy. *How To Live*, by Irving Fisher and Haven Emerson, Funk and Wagnalls, 20th edition, is recommended without reserve for lay readers especially. *Osler's Principles and Practice of Medicine*, by Sir William Osler, 13th edition, Revision by Henry A. Christian, Appleton-Century, is a truly great work which has been acclaimed over the entire world. This revision is welcome in spite of some criticisms. *Successful living*, by W. Beran Wolfe, Farrar & Rinehart, is a good investment which has a high degree of useability for men and women in active life. *Legal Medicine and Toxicology*, by Thomas A. Gonzales, Morgan Vance and Milton Helpert, Appleton-Century. Out of their extensive experience in the Medical Examiner's Office in New York City the authors of this monumental work have produced an eminently practical text on the duties and activities of coroners and medical examiners, and the technicians employed by them. *The Public Assistance Worker*, edited by Russell H. Kurtz, Russell Sage Foundation, is as comprehensive a survey of the public assistance field as has yet been written.

A Brief History of Bacteriological Investigations of the United States Public Health Service—By A. M. Stimson. Supplement No. 141 to the Public Health Reports. Washington: U. S. Government Printing Office, 1938. 83 pp. Price, \$.15.

This is an interesting and useful compilation. It begins with the founding of the Public Health Service in 1798, tells of the establishment of the Hygienic Laboratory in 1887, gives short descriptions of the other research institutions operated by the Service, including the National Leprosarium at Carville, La., and the Kalihi Hospital in Honolulu, and includes a picture of the founding of the new National Institute of Health Administration Building in June, 1938.

Thirty-seven subjects, beginning with anaphylaxis, are covered alphabetically. The history of plague is particularly interesting. Many of us remember the situation in San Francisco when Kinyoun discovered plague there. It is an unsavory story and we wish it had been given at somewhat greater length. Finally the Public Health Service was asked to clean up Chinatown and, as Dr. Stimson says, "it actually performed this Herculean feat," but he does not say, as we think he should have done, that this was under the direction of Rupert Blue, afterwards Surgeon General. We can admit that Kinyoun had the roughest time and did not obtain the support he should have had from certain quarters but, next to him, Blue went through a most trying experience and he should be given credit for his splendid accomplishment of the task.

Under poliomyelitis, the experiment by Anderson and Frost in the transmission of the disease by the *Stomoxys calcitrans* is quoted with what seems to be indirect approval, though the author goes on to say that other officers of the Service, notably Leake, Bolton,

and Smith, soon convinced scientific people that *Stomoxys calcitrans* played no determining part in the transfer of the disease.

The most notable omission, and one which does not seem to be justified, is under the head of yellow fever. The author states the "bacteriological work relating to the disease was going sadly awry." He gives the findings of Geddings and Wasdin in confirming the claims of Sanarelli concerning the *B. icteroides* as the cause of the disease, for which they were decorated by the Italian government, though their error was promptly demonstrated. The author does not mention the fact that the U. S. Public Health and Marine Hospital Service, as it was then known, established a Yellow Fever Institute. In 1903, Working Party No. 1 of the Institute, consisting of Dr. Herman B. Parker, Assistant Surgeon, and Drs. George E. Beyer and O. L. Pothier, Acting Assistant Surgeons, made a report which was issued by the Government Printing Office, March, 1903, in which they described a "protozoan parasite," the "*Myxococcidium stegomyiae*," which they believed to be the germ of yellow fever. This should be included in any history of the work of the Public Health Service. Their claims were studied by James Carroll, a member of the Reed Commission, who made a devastating report which was published in the *J.A.M.A.*, Nov. 28, 1903, Vol. 41, page 1341, proving that the "protozoan parasite" was yeast probably derived from bananas.

Deserved tributes are paid to Dr. Kinyoun, the founder and first Director of the Hygienic Laboratory, who deserves all that can be said of him as an officer, a scientist, and a man, to Dr. George W. McCoy, who was Director of the Laboratory from 1915 to 1937, and to Dr. Joseph Goldberger, especially for his researches on pellagra, and to Dr. Henry R. Carter for his

brilliant epidemiological studies on yellow fever. All of these tributes are richly deserved.

One typographical error has been detected on page 38, which is unfortunate, since the history will perhaps be read by others than professional bacteriologists—"B. eoli communior." The booklet is a convenient reference for anyone interested in the history of the Service.

MAZŮCK P. RAVENEL

Avian Tuberculosis Infections—

By William H. Feldman, D.V.M., M.S.
Baltimore: Williams & Wilkins, 1938.
483 pp. Price, \$7.00.

The author's exhaustive researches are exemplified in this well written book, which reviews the literature, examines the extant data critically, and points the way for further investigation in the field of avian tuberculosis. The volume is a splendid contribution to the literature on tuberculosis.

It is pointed out that "the rôle of the avian tubercle bacillus in tuberculous infection is not well understood"; that "the ability of the bacillus of tuberculosis of chickens to infect a long list of heterologous hosts makes this member of the genus *Mycobacterium* of considerable importance to the student of infectious diseases"; that avian tuberculosis, which is the most widespread and economically one of the most important diseases affecting poultry, constitutes a problem of considerable magnitude to the \$200,000,000 poultry industry to the extent of losses aggregating to \$12,000,000 annually; and further, that "dissemination of the disease from infected poultry to swine and other mammals constitutes a problem the economic significance of which is perhaps equal to that caused by infection in the original host."

The first chapter gives a kaleidoscopic historical résumé of avian tuberculosis, its incidence and geographical distribution. The second chapter deals

with the biologic characteristics of the causative agent. A chapter is devoted to the isolation and culture of avian tubercle bacilli. There are sections on the diagnosis, the pathologic anatomy, and experimental tuberculosis in chickens. A detailed description is given of laboratory procedures for demonstrating tuberculosis infection in mammals and fowl. Four chapters deal with the pathogenicity of avian tubercle bacilli for fowl other than chickens, for certain mammals other than man, for cattle and swine, and for human beings. The author cites 13 specific cases of tuberculous infection in human beings in which the presence of avian tubercle bacilli appears to have been demonstrated, and then gives the details of 24 cases of alleged avian tuberculous infection in which the data were insufficient to support the diagnosis with the comment that "an analysis of the recorded data, obtained by reviewing the records as originally published, indicates that in the majority a diagnosis of avian tubercle bacillus infection was questionable or erroneous."

The author states further "when one considers the countless thousands of instances in which the type of the tubercle bacillus in human infections has been determined since the time of Koch, it may seem strange that the avian tubercle bacillus has been demonstrated so rarely. The explanation can only be that human beings have a formidable resistance to this particular form of the tubercle bacillus. The opportunities for infection are numerous, and if the avian tubercle bacillus were virulent in the accepted sense for human beings, it would seem reasonable to expect a far greater number of proved cases. Apparently, therefore, it is only the exceptional individual who becomes infected with the avian tubercle bacillus."

The book concludes with chapters on tuberculin testing and the public health aspects of the disease.

The enormous amount of research done by the author is significantly portrayed in the voluminous lists of references following the various chapters.

The photographs, tables, printing, and arrangement of material are in keeping entirely with the excellence of the subject matter. The book is recommended without reservation of any kind. BERNARD S. COLEMAN

Teaching With Motion Pictures: A Guide to Sources of Information and Materials—By M. E. Townes. *New York: Teachers College, Columbia University, 1938.* 28 pp. Price, \$.25.

Probably the most complete guide in print prepared for those "who use the motion picture as a teaching aid," its interest and helpfulness extends beyond the teaching field. It covers both educational and theatrical pictures. There is much for the parent and the student of motion pictures.

The information as to sources of existing pictures, and new pictures, is comprehensive. *Movie Makers* is omitted as a source of new pictures, and of free ones. "Making Motion Pictures in School" omits the National Board of Review as a source of information on school clubs and their picture production, confuses the mention of Amateur Cinema League, which is not a club, but a national source of information, through its magazine about local clubs and school made pictures.

EVART G. ROUTZAHN

An Introduction to Bacteriological Chemistry—By C. G. Anderson. *Baltimore: Wood, 1938.* 278 pp. Price, \$4.00.

This book does not attempt to be a complete treatise, but it covers the subject adequately for anyone who desires to obtain a general survey of the field. The material is treated under three major heads, covering the general

aspects of bacteriological chemistry, the metabolism of bacteria, and a summary of certain aspects of immunochemistry.

Although the author presupposes a knowledge of the fundamentals underlying the field, he gives in Part I an adequate summary of the physical chemistry of certain very important processes in bacteriology. This includes colloidal phenomena, the measurement and importance of hydrogen ion concentration, and oxidation-reduction potentials.

Part II, the metabolism of bacteria, contains chapters on the nutrition of autotrophic and heterotrophic bacteria, nitrogen and carbohydrate metabolism, the proteins, carbohydrates, and lipoids of microorganisms as well as a brief summary of industrial fermentations. Karström's work on adaptive and constitutive enzymes are adequately discussed.

Part III deals with the chemistry of antigens, haptens, antibodies, and complement as well as the mechanism of antigen-antibody reactions. A fairly complete summary of our knowledge of artificial antigens is given. The final chapter lists a few of the methods used in the isolation and identification of some of the metabolic products of microbial activity.

The author has made no attempt to deal with the chemistry of culture media, staining reactions, disinfection, or chemotherapy. The printing and make-up are excellent. There is a good index. OLIVER H. PETERSON

Lillian Wald, Neighbor and Crusader—By R. L. Duffus. *New York: Macmillan, 1938.* 371 pp. Price, \$3.50.

In presenting the great personality of Lillian Wald, the author also gives a somewhat intimate picture of the origin of many significant developments in American life which were guided in no small degree by the founder of Henry

Street Settlement. Miss Wald's genius in organizing and directing humanitarian enterprises, her rare humor and deep sympathy, her vision, and her active participation in liberal movements of her generation are vividly portrayed in this volume describing the career of one of the best known and beloved women of her time.

The conception and growth of public health nursing, including school nursing, the idea for the organization of the United States Children's Bureau developed at the breakfast table at Henry Street, important contacts in local, state, national, and international affairs, as well as glimpses of the daily life of Miss Wald, are described in a manner to interest a wide audience.

IRA V. HISCOCK

Maternity Care in a Rural Community—By *Maxwell E. Lapham, M.D.* New York: Commonwealth Fund, 1938. 65 pp. Price, \$.25.

This concise, readable, little volume should be of interest to public health workers and physicians practising obstetrics wherever conditions surrounding childbearing are similar to those prevailing in Pike County, Miss., which, the reviewer judges, is a typical "rural community." More than two-thirds of Pike County's citizens live in the country. Nearly half the mothers are delivered by ignorant midwives. Maternal and neonatal death rates are high.

The Pike County Health Department has sought to remedy the situation by furnishing the following services: prenatal and postnatal visits; clinics for medical examination of maternity cases not under a private physician's care; clinics for the treatment of syphilis; instruction and supervision of midwives.

This study, made through the coöperation of the Commonwealth Fund, the local practitioners and the local health

department, shows what was accomplished during the period 1931 to 1936. Using objective standards it gives a very detailed appraisal of the nursing services. It also evaluates with care the other health department activities and the current midwife and medical practice.

On the basis of the facts revealed, the author suggests specific ways in which every phase of maternity care as provided in Pike County could be improved. His recommendations are sound, practical, and of wide application.

HESTER B. CURTIS

Teachable Moments—*A New Approach to Health*—By *Jay B. Nash.* New York: Barnes, 1938. 245 pp. Price. \$1.50.

The title of this book refers to the moments when one is in a position to learn efficiently and rapidly. In the health field, the author states; there are at least four such moments: when a child exhibits curiosity or feels that differences make him conspicuous; in adults, when they are scared, or when, as parents, they want something better for their children.

Since such moments occur but rarely in a formally organized classroom, and since "there are not enough hygienic facts worthy of memorization to challenge an average intelligent child for over an hour a week for a semester," the author concludes that hundreds of thousands of dollars are being wasted each year "in earnest but misguided attempts to promote health through teaching hygiene." The child is much more apt to develop healthful habits if he gets his hygienic training in a home and a school which are in themselves wholesome, and which present surroundings conducive to proper health practices. It is the business of the adults to protect the children and to provide a wholesome environment for them; not to talk to them about health

and to make them thereby more self-conscious and afraid.

This challenge to health education is presented with a summary of the health facts which the adult needs to know in order to provide this wholesome environment. Attainment rests on a foundation of rest, sleep, and balanced diet, plus happiness, especially joy in one's work.

While many of the criticisms of modern health education are justified, one questions if a true picture has been presented of schools in general at the present time. The author holds promise for adult health education, although few constructive suggestions are given, as would seem desirable if it is to be the acme of health instruction.

Expressing challenging and critical statements about health education, the book should provoke discussion and stimulate thought about ways in which present methods of teaching health in schools can be improved so that no author can again call it "a remnant of the Middle Ages philosophy of scholasticism."

MURIEL BLISS

Reference Handbook for Nurses
—By Helen F. Hansen. Philadelphia: Saunders, 1938. 347 pp. Price, \$1.50.

Miss Hansen's handbook, designed for anyone doing bedside nursing, should prove a welcome and valuable aid to the public health nurse. It contains in concise form information necessary to giving adequate, effective nursing care and to making intelligent observations.

A very practical bit of advice is given regarding the importance of keeping one's registration up to date and, before accepting a position in another state, ascertaining if one will be eligible there for registration.

The volume is divided into two parts. Part one discusses such topics as first aid, materia medica, frequently used

nursing procedures, and dietetic therapy. Principles of first aid in general and of emergency treatment of poisons in particular are discussed, as well as symptoms and treatment in conditions such as bites, fractures, hemorrhage, wounds.

Paragraph headings in heavy type facilitate finding information; cross references are made to places where a more complete consideration of a topic is given. The section devoted to materia medica includes a review of common weights and measures. Common drugs used are classified in the basis of site of action. The average dose, toxicology and treatment are briefly discussed. The fact that the use of protamine insulin is considered indicates that recent developments are included. A wide variety of frequently used nursing procedures, treatments, and diagnostic tests are presented. Stress is placed upon preparing the patient emotionally and utilizing opportunities to teach personal hygiene. The matter of sterilization of equipment is approached in a manner which makes it applicable to a home situation. Likewise, suggestions for improvised equipment may give new ideas for more effective care.

Part two, "Notes on Nursing," is particularly well written. It contains pertinent information related to medical and surgical conditions, communicable diseases, psychiatric nursing, obstetric and gynecological nursing, in which the preventive aspect is stressed. A brief discussion of child care emphasizes normal growth, development, and the ideal of positive health. Attention is called to the importance of regarding the child as an individual and guiding him in making adjustments to his environment.

Throughout, particular emphasis is placed upon preventive aspects and upon the opportunities of the nurse as a health teacher. The style is readable and clear.

O. E. CARLSON

The Culture of Cities—By Lewis Mumford. New York: Harcourt, Brace, 1938. 586 pp. Price, \$5.00.

For over 15 years Lewis Mumford's writings have reflected a deep insight into the problems of decent human living as they are affected by the physical character of cities and urban housing. His latest book, widely hailed as a major contribution to the social thinking of our generation, will be of direct interest to many in the health profession for the light it throws on the relation between city building, housing, and the opportunities for an urban life which shall be not only healthful in the technical and statistical meaning of the term but vital and self-renewing in the broadest sense.

The first half of the book treats of the manner in which cities have grown since the Middle Ages, tracing (with the aid of consummately well chosen photographs) a steady decline in the fundamental human decencies from the walled medieval town to the vast, sprawling, crowded, unplanned aggregations of people and buildings, the "insensate industrial towns" of the 19th century. In a masterful first chapter which is one of the high points of the work, Mumford challenges the customary view of the medieval town as crowded and essentially unhealthful, holding it rather to have been relatively open, well-scaled to human needs and activities, and hygienically superior in many respects to the more complex cities which followed it down to the last half-century.

The decencies and amenities of living are shown to have been less and less considered as the city evolved from its primitive form through the Renaissance or Baroque city—with its emphasis on the broad avenue for military display, its grandiose architectural façades to glorify the agencies of political power—to the industrial megapolis which sacrificed all human

decencies to the planless crowding of workers near their shops and factories.

Though his damnation of the city as we have known it is hardly to be matched for vigor, Mumford is no medievalist, no advocate of return to the hand-loom and the subsistence-homestead as the road to a durable society. He does not argue the impermanence of the great city, but rather the possibility of humanizing it. The later sections of the book review the means at hand (some of them far more highly developed and better tested than is generally recognized) for this humanization: regional planning as a background for stable urban development; decentralization of metropolitan population and of the less specialized urban functions into satellite garden cities which can support the necessary specializations of the mother city; progressive community planning and modern housing as a means of rebuilding the mother city itself—all with the purpose of giving greater dignity and permanence to the physical city, new spirit and well-being to the human beings who comprise the city, and new vitality to the culture that is the city's excuse for being.

ALLAN A. TWICHELL

The Self You Have to Live With—By Winfred Rhoades. Philadelphia: Lippincott, 1938. 182 pp. Price, \$1.75.

This is essentially an inspirational book, a modern version of those treatises on life, of long and honorable literary history, that have drawn on the common sense and wisdom of the ages, back to the inspired scriptural writers and the ancient Greek philosophers from whom we have inherited treasures of knowledge held valid to this day. To the precept "Know Thyself" the present author adds the injunction "Live With Thyself," positing under this concept a rule of life that draws

liberally on the findings and teachings of modern psychology and psychiatry adapted to his personal philosophic predilections. Reflecting the lessons of his own life and a desire "to pass along to other suffering and struggling people some of the things I had learned in the hard and long school of personal sickness," his essay may be said to derive from a "variety of religious experience" that gave him motive power and insight making for healthy personal adjustment of a quality and degree he confidently considers attainable by others like-minded in their grasp and acceptance of certain underlying principles and attitudes.

It is a combination of spiritual and mental hygiene that we are offered in this treatise on "how to live," which is based also on the author's psychological work in the Boston Dispensary unit of the New England Medical Center, where he has conducted classes in "thought control" and helped and advised individuals with adjustment problems. While tenuous in its psychological material, it has great value, in the opinion of this reviewer, in the attention it gives to volitional factors and in its appreciation of the rôle of "will" in human behavior, which modern psychology tends to neglect in its preoccupation with thought and emotion. Hence the relevance of religion, as well as psychology, in human motivation and conduct, as emphasized by this writer and as other psychological writers are coming vaguely to recognize. But the "return to religion" must be rooted in sterner stuff and in solidier concepts of the nature and meaning of religion than some psychologists are offering us at this time, if the mechanists, determinists, and materialists of mental science are to be convincingly gainsaid. The present author, for example, defines religion as "intrinsically not a belief, not a doctrine . . . but conscious association with the divine Spirit and

Life." This is a pale formula to oppose to the negative convictions of the psychoanalyst who regards religion as an "illusion." PAUL O. KOMORA

Carbon Monoxide Asphyxia—By Cecil K. Drinker, M.D., D.Sc. *New York: Oxford University Press, 1938.* 276 pp. Price, \$4.50.

We have long known of Dr. Drinker's intimate knowledge of carbon monoxide poisoning and a profound textbook on the subject by him is a welcome and timely accession to the literature on this important subject. The work is dedicated to Oscar H. Fogg, first with the American Gas Association and later with the Consolidated Edison Company of New York, because of his untiring efforts for safety in the use of gas. It is written primarily for those who have practical concern with carbon monoxide asphyxia, and as a contribution to its intricate physiology and biochemistry. The detached point of view of both the medical investigator and the industrialist has been kept in mind. Chiefly facts, but some best theories, have been extensively culled from the literature and evaluated in relation to modern knowledge so that many authorities are cited and not a few quoted at length.

The reviewer is profoundly impressed with the care of preparation and the fine choice of language and description, which is always concise and practically never leaves any doubt in the reader's mind as to shades of meaning. The possibilities under different situations are almost invariably fully discussed, leaving few if any questions in the reader's mind. One senses throughout the strictly critical and impartial attitude of the true scientist who is thoroughly familiar with the subject he treats. The author has left the important chapter on analytical methods to Julius Sendroy, Jr., in which again one finds a masterful handling of the chief historical methods and the ac-

cepted present-day procedures, aided by three valuable tables, and guided by the opinions of the author as to the relative importance of various procedures.

Most valuable features of the text are the suggestions for further observations on various desired or controversial points.

This reviewer has found very little for critical comment. There is little repetition. Possibly a few paragraphs might have been included on the chemistry and metallurgy of carbon monoxide, the temperatures at which it may be oxidized to complete combustion under different conditions of physical surroundings, etc. The author has been very careful to distinguish between carbon monoxide and illuminating gas although there is some doubt on page 34, while Case No. 3 on page 41 is probably not a good selection since the patient could not be followed long enough. Also, in the table on pages 38-39, the previous condition of the hearts of the various cases had no doubt to be omitted as unknown, yet such would seem essential in establishing the circulatory effects on the patients after carbon monoxide asphyxia. On page 103 the author appears to be opposed to the requirement for ventilating all gas appliances with flue connections, but such a provision was enacted by the Ohio Public Health Council about 1923, covering all gas outlets in new construction, except those for lighting purposes only, and has appeared to be satisfactory, although the reviewer is conscious of the great lack of enforcement of the provision—due chiefly to lack of funds for supervisory services. In the table on page 142 it would strike the reviewer that all cases showing more than 115 per cent hemoglobin would imply a "conspicuous increase" whereas the author would include only three cases ranging from 134 to 154 per cent, but the point is a small one.

The exact complexion of what is

meant by "chronic" carbon monoxide poisoning is admirably handled. In regard to this form of poisoning, the author has apparently overlooked Charles Weisman (*Pub. Health Bull.* 81, 1917) on the "Effect of Gas-Heated Appliances upon the Air of Workshops," in which also appears a valuable Appendix B containing an abstract of an article by Morel and Mouriquand from a French source (1910) on a remarkable series of cases exposed for several years and followed up later.

We also note no comment on the use of nitrites in treatment, at the same time well recognizing, as Dr. Drinker says, "that practically every possible and impossible drug has been used in carbon monoxide poisoning."

When one faces the enormous literature on this, "the most widespread poison connected with human life and activity since the first discovery of fire," there can be no doubt that Dr. Drinker has selected and evaluated the essentials and drawn from his own experience the most masterful conclusions we have upon the subject at the present time.

EMERY R. HAYHURST

Proceedings, National Health Conference. 163 pp. Price, \$35.

The Nation's Health. 116 pp. Price, \$20.

Toward Better National Health. 30 pp. *By Interdepartmental Committee to Coördinate Health and Welfare Activities.* Washington: U. S. Government Printing Office, 1938.

Every serious student of the problem of providing adequate medical care will need to possess the first of these publications. It is a verbatim report of the National Health Conference, indexed by speakers. It includes the full report of the Technical Committee on Medical Care.

The second publication is intended to give the same information in a briefer and more readable form. Both

the proceedings and the report of the Technical Committee have been edited. Headlines and a running commentary are supplied and numerous extracts from speeches are included in eight-point type. The editors have been careful to underline harmony and to delete discord. The full story of the conference to be read comfortably in the proceedings is well worth the extra fifteen cents.

Toward Better National Health is frank propaganda* well illustrated with photographs from the Department of Labor, the Farm Security Administration, the Public Health Service, and the Works Progress Administration. It is designed to promote public support for legislation which will embody the proposals of the Technical Committee on Medical Care. Since dictatorial governments cannot function without propaganda, it is probable that democratic governments will be obliged to use increasingly all the instruments of publicity to state their case to the voters. Incidentally the exponents of popular health education may well study this pamphlet as an example of how it should be done.

* This word is used in the sense of "special pleading." It is not intended to imply the use of any artifice of deceit.

J. ROSSLYN EARP

Diseases of the Skin for Practitioners and Students — *By George Clinton Andrews (2nd ed.). Philadelphia: Saunders, 1938. 899 pp. Price, \$10.00.*

To the professional worker in public health there are likely to be two aspects of a treatise on dermatology in which he is specially interested, the Sections on syphilis and on the exanthemata.

The former may be said to receive adequate treatment, at least so far as the skin eruptions are concerned, in more than a hundred pages covering

this multiform disease. The diagnosis and treatment are described in terms of the findings of the Cooperative Clinical Group.

With respect to the exanthemata, the author apparently considers them not to be "diseases of the skin" and consequently dismisses scarlet fever and measles with only a word. It may properly be asked where an epidemiologist may expect to find help in the differential diagnosis of skin eruptions if not in such a text as this, especially when diphtheritic infection of the skin, tuberculosis of the skin, and many of the rare tropical eruptions are so fully described. The addition of such a section would enrich a subsequent edition for all public health workers.

As a whole, this volume may be regarded as excellent, partly because of the lucidity of the text and certainly because of the quality of the illustrations, of which there are 938. The author's treatment of the cutaneous manifestations of tularemia deserves special mention, and the section on leprosy is unusually good. A well prepared index rounds out a book, which can be recommended in its field.

REGINALD M. ATWATER

Medical Information for Social Workers—*By William M. Champion, M.D. Baltimore: Wood, 1938. 529 pp. Price, \$4.00.*

Dr. Champion and 8 coworkers from the Faculty of Western Reserve University School of Medicine present 30 chapters of medical information for the social worker "to enlighten beginners in social work and to enrich the medical knowledge at the command of the more mature social worker."

There are an introduction and three chapters dealing with the fundamentals of the social worker's need for medical information, historical aspects of medicine, and notes on the selection of a physician. Then follow 9 chapters

on diseases of the adult including, among others, diseases of the cardiovascular system, arthritis, rheumatic fever, respiratory diseases, endocrine disturbances, allergic diseases, syphilis, and tuberculosis. The section on pediatrics has 6 comprehensive chapters with special emphasis on the care of the new-born, "the first year," and on feeding and nutritional problems. The more common diseases of infancy and childhood are described.

The portion of the book devoted to surgery discusses indications for operation, blood transfusion, asepsis, trauma, amputations, and other conditions which have a definite medical-social significance, indicating the service the social worker can render to the surgeon and to the patient in explaining to the patient the need and indications for surgical treatment and in effecting adjustment of compensation claims, etc.

Nine chapters give medical information in the more specialized fields of cancer, gynecology, orthopedics, diseases of the ear, nose, and throat, and finally obstetrics.

Concluding this volume are an appendix on exercises in anatomy and physiology, and a bibliography of selected references to supplement the subjects discussed in the text. This collateral reference list has been chosen with care.

Throughout the book the reader is impressed with the simplicity of the language, the orderly presentation of the material, and the emphasis on the usefulness of the medical information to the social worker. It is only regrettable that some statements which are given as facts are not qualified. For example, in the chapter on tuberculosis, it is stated that this disease "still kills approximately 100,000 persons each year" in the United States. In 1937 there were 69,151 deaths according to the National Tuberculosis Association. Also, Dr. Koch discovered the tubercle

bacillus in 1882 and not in 1870, the date given.

In spite of some inaccuracies and scattered positive statements on moot questions the book should be helpful to social workers and others who are frequently in contact with the sick.

BERNARD S. COLEMAN

Biology and Pathology of the Tooth and Its Supporting Mechanism—By Bernhard Gottlieb and Balint Orban; translated and edited by Moses Diamond. New York: Macmillan, 1938. 195 pp., 166 ills. Price, \$5.00.

The views of Gottlieb, and later, of Gottlieb and Orban, on the physiology and pathology of the periodontal tissues have been known to the dental profession in America for a number of years, chiefly through articles in the journals. Now for the first time a comprehensive presentation of their findings is available in book form in English.

While not all American research workers are in agreement with all the beliefs held by these notable workers in the field, it remains true that they have satisfactorily elucidated many of the fundamental facts in this field on which tenable theories must be built. Particularly important is their presentation of the biology of the supporting mechanism of the teeth, to which the major part of the book is devoted. Throughout much emphasis is given, and rightly so, we believe, to the relations between the state of the occlusion (bite) and the health of the periodontal tissues.

In the section dealing with disease of the supporting tissues of the teeth, several statements are made that are of interest to the physician and public health worker. In discussing ulcerative gingivitis, the authors suggest that the fusospirochetal organisms may not be the cause of this condition since they are

found in many healthy mouths as well as in cases having this disease. The ready communicability of the disease in acute cases will lead the epidemiologist to question this statement, but the basic contention of the authors is undoubtedly sound as regards the true cause lying in a susceptibility of the tissues due to other factors. Again they state that pyorrhea is not so important a cause of toxemia from focal infection as periapical infection, since the pyorrhea pocket has free drainage. Careful evaluation of this statement is needed especially with regard to such factors as pocket depth and involvement of the bifurcations of the molar teeth.

In regard to pathology the authors reiterate their earlier statements that there are two types of periodontal disease, Schmutz (Filth) Pyorrhea and Diffuse Atrophy. Discussion of the latter condition is somewhat unsatisfactory due to lack of a definitive statement as to its nature and cause. Much light is nevertheless shed on the course of the pathologic processes under consideration.

Throughout the book the beautiful reproductions of histologic and histopathologic specimens assist the authors in presenting their views and add to the enjoyment of the reader. Here is presented for the first time, so we understand, a new process of photographic reproduction. The results are worthy of special comment.

The work of Diamond as translator has obviously contributed much to the readability of the book. Whether in agreement with all the views of the authors or not, the book is a "must" item for anyone who attempts to gain a real understanding of the periodontal tissues in health and disease.

JOHN OPPIE McCALL

Manual of Public Health: Hygiene
—By J. R. Currie, M.D. Baltimore: Wood, 1938. 324 pp. Price, \$5.00.

Dr. Currie, Professor of Public Health at the University of Glasgow and Examiner in Public Health for the License and Diploma of the Triple Board in Scotland, has prepared this manual of public health and hygiene primarily for the use of medical students. The volume is in the nature of a summary of subjects with which the health officer deals in his everyday duties, and recapitulates the subject matter in the course of public health to which medical students are exposed during their academic training.

The author has designed the book in a novel way undertaking to arrange the chapters so that priority is given to the "social aspects of Hygiene," that is, in the words of the author, "the attempt is made to follow the individual, in his relation to the social services, from his inheritance through his prenatal and infant existence, his young childhood and his school years to his active working life and finally, his old age." Thus there are short chapters on inheritance, maternity and child welfare, school hygiene, mental hygiene, industrial hygiene and social insurance. Only 4 pages are devoted to Public Health Administration (England and Wales and Scotland), and 10 pages to vital statistics. There is a section on Food. Then follow chapters on ventilation, heating, lighting, water supply, waste disposal, housing, and hospitals. Between the sections on the health services of communities and those on infection and infestation is a concise chapter on personal hygiene.

The concluding chapter on international health relations deals with sea and air-port sanitary regulations, protection against invasion by disease from foreign lands conveyed by the steamship and aeroplane, and finally with an account of air-raid precautions relating exclusively to civilian action in preparing against "war gas" attacks, with a description of methods for providing

collective and individual protection. The note on "Air Raid Precautions" has been added because "it now appears that in view of recent belligerents the unarmed civilian population of an enemy country is a fair mark for bomber aircraft."

The volume is precise. Fifteen tables and 34 photographs, diagrams, and drawings accompany the text. There is an index but no bibliography nor references, which, if carefully selected, would have enhanced greatly the value of the book. BERNARD S. COLEMAN

Air Conditioning for Comfort—By Samuel R. Lewis (3rd ed.). Chicago: Keeney Publishing Co. 285 pp. Price, \$2.50.

This is a good, lucid, elementary engineering text. It has little to do with public health. The second edition was reviewed in this *Journal* of March, 1936, p. 303. The present edition is reviewed favorably and more fully in the October, 1938, issue of *Heating, Piping and Air Conditioning*, the publication which carries the Journal Section of the American Society of Heating and Ventilating Engineers.

CHARLES LUNDY POOL

Nutrition and Diet Therapy—By Fairfax T. Proudfit (7th ed.). New York: Macmillan, 1938. 923 pp. Price, \$3.00.

This is the seventh edition of a book that has become very well known and widely used since its first appearance in 1918. The present edition has been revised and reorganized to comply with the new curriculum of the National League of Nursing Education.

In the section on normal nutrition every effort has been made to stimulate the student to do individual thinking. Laboratory lessons have been added to the dietetic section to coördinate with the different chapters of lecture material, and have been arranged in a

separate section to facilitate their use.

Laboratory work is appended to each chapter in the diet-therapy section as a practical application of the theory. In this manner emphasis is placed on the reasons for the modifications of the diet necessary to meet the specific pathological condition. The laboratory procedures may be carried out in the laboratory, classroom, or special diet kitchen as the situation permits.

The last section of the book contains a series of recipes for the dishes mentioned in the text, and also an appendix of over 60 pages giving very useful tables of food values, vitamin contents, ash constituents, etc., a personal health standard and scale, quiz questions on the text, and a list of reference readings.

An effort has been made—

To show the close relation of good nutrition to good health and to impress the student with the importance of maintaining a high level for her own health standards, stressing the part good food habits play in keeping her body fit. A course of reading has been suggested which should keep the student abreast of the nutrition work being carried on as part of a program for the peace and happiness of people throughout the world.

C. R. FELLERS

Sleep—By Ray Giles. Indianapolis and New York: Bobbs-Merrill, 1938. 290 pp. Price, \$1.75.

This popular treatise on sleep, "the secret of greater power and achievement," was written "to help you to enjoy your waking moments still more by improving your hours in bed." The book is based on psychological and physiological research of such authorities in the field as Dr. Donald A. Laird. Interspersed with this scientific background, are frequent quotations from the private sleep recipes of famous people, especially from authors, actors, and artists. While these quotations add popular appeal, the author properly questions how fully the suggestions should be advocated.

The book gives practical suggestions for the improvement of sleep, deals with the effects on sleep of various factors, such as evening exercise, night snacks, sleeping powders, beds and mattresses, light and noise, posture, diet, and worry. Throughout, emphasis is given to the relation of good physical condition and proper health habits to sleep. At the end of the book is given a list of 51 questions on physical and mental health habits and conditions. Perhaps insomniacs will discover the clue or even the underlying cause for their complaint in their answer to these questions.

One of the major criticisms of the book will probably be the fact that it presents many conflicting opinions, without giving, in some cases, correct conclusions, thus leaving the reader to draw his own. The author justifies this by the fact that there is disagreement on many phases of sleep, even among medical authorities. The book is interestingly written.

IRA V. HISCOCK

Bergey's Manual of Determinative Bacteriology—By *David H. Bergey, Robert S. Breed, and E. G. D. Murray (5th ed., advance reprint)*. Baltimore, Md.: Williams & Wilkins, 1938. 77 pp. Price, \$1.00.

The preprint includes the Table of Contents for the book, 68 pages of general discussion, a Key to the orders of the class Schizomycetes and a Key to the families of the order Eubacteriales.

A Historical Survey of Classifications, omitted from the 4th edition, has been rewritten with emphasis on outlines proposed since 1923. It forms a valuable reference background.

The section on How Bacteria are Named and Identified is carried over from the previous edition.

The Rules of Nomenclature have been considerably revised in accordance with the revision of the International

Rules of Botanical Nomenclature (Amsterdam Congress, 1935) which are quoted in so far as they apply to bacteriological nomenclature.

Comment upon changes in the systematic position of various organisms is difficult until the complete text of the book becomes available. At a glance the reviewer sympathizes with the transference of *Klebsiella* to a position close to *Aerobacter* in the tribe *Escherichiae* but awaits with interest the reasons for placing *Serratia* in the family *Enterobacteriaceae* and the exclusion of *Alcaligenes* from this family. The family *Mycobacteriaceae* has probably been deprived justly of 6 genera which have been placed in other families. The change in the generic name of the glanders bacillus from *Pfeifferella* to *Actinobacillus* to *Malleomyces* is probably justified on the basis of priority; the last is a good descriptive name and we hope it has returned to stay but the reasons for its inclusion in the tribe *Pasteurellae* are not fully apparent. Fortunately only the generic and specific names of organisms are commonly used; consequently they may be transferred from one tribe, family, or order, to others without disturbing the nomenclature. The names of genera and species become embedded in the literature. It is cause for gratification that only eight new generic names are introduced in the 5th edition of *Bergey's Manual*. Until more is known about the definition of a bacterial genus it is well to be conservative. As is recognized in the pages of general discussion of the reprint, the question of genera among the bacteria is at present largely a matter of convenience. In the past it was a matter of convenience (now outgrown) that all rod-shaped bacteria were called *Bacillus*. Largely because so many bacteriologists were working with the Gram-negative bacilli, it became convenient to divide these into a number of genera. It may be that

this division has gone far enough or even too far in some instances; e.g., it may be that *Escherichia*, *Aerobacter*, and *Klebsiella* will be found to form one natural genus and that *Eberthella* and *Salmonella* may form another. If generic distinctions of similar magnitude were applied to the many species of sporulating aerobes (*Bacillus*), sporulating anaerobes (*Clostridium*) and streptococci (*Streptococcus*) each of these genera might be subdivided into many genera. The responsibility for naming bacterial species is not quite so great, for, although knowledge of the organisms may be far from complete, the determination of stable differences under identical conditions provides a fair basis for specific differentiation.

The continued issuance of editions of *Bergey's Manual* is a sustained effort to evaluate and correlate the work of individual systematists and, under competent authorship, is of the utmost importance to bacteriology.

J. HOWARD BROWN

Safety Education Through Schools—*National Education Association, 1201 16th St., N.W., Washington, D. C., 1938. 60 pp. Price, \$.25.*

This is a "research bulletin" covering current school practices and teaching methods in elementary and high schools, and "necessary improvements in the teaching of safety."

Practically all forms of safety practice are represented in the list of 63 non-school organizations distributing free and inexpensive material—teaching guides, printed matter, plays, posters, films, slides, and film slides. Generous annotations seem to make clear what is available from each source. However, there is no evaluation of teaching values.

Under "Reviews of Safety Films and Slides," all necessary information is given as to 99 individual movies, 16 sound-slide films, and film strips. The

brief synopsis for each film and slide-film includes an attempt at evaluation, and an indication of the advertising content, if any.

Of course much of the material described is usable with adult audiences.

EVART G. ROUTZAHN

Penny Marsh: Public Health Nurse—*By Dorothy Deming, R.N. New York: Dodd, Mead, 1938. 266 pp. Price, \$2.00.*

This is one of a group of Course Books, presenting in entertaining story the "requirements, problems, pleasures, and future possibilities of selected fields of work" for young people. Penny Marsh does all of this and more. It is a well written, swiftly moving story of a young nurse who becomes a public health nurse.

The heroine becomes interested in doing visiting nursing in a small city, she takes a course in public health nursing, she becomes a county public health nurse on her own, with all the adventures a nurse might have. The climax is her experience in a flooded town on the Ohio—all of which is told with interest and authenticity. Nicely balancing the professional side is a love story, which reaches a satisfactory conclusion after some suspense.

Written for high school age and older girls, the book should be popular, and for a girl looking for advice on a career, this should help materially. In fact, many recruits might come to the ranks of public health nursing—there is such appeal in the story for the budding careerist. M. McC. Hiscock

Textbook of Anatomy and Physiology — *By Diana Clifford Kimber, Carolyn E. Gray, and Caroline E. Stackpole. (10th ed.) New York: Macmillan, 1938. 643 pp. Price, \$3.00.*

This excellent book was first copyrighted in 1893 and has now reached

its 10th edition. It has been improved and brought up to date. The added material brings it to such a level that it meets the requirements of the new curriculum but still in its simplicity and style it remains a tradition in the schools of nursing today. The correlation of the anatomy proper with the various organs and systems of the body makes the subject matter so easy to understand that the student nurses soon lose their fear complex as step by step they grasp the knowledge of the body structures and the life processes in which they take part. This old friend to the nurses in its new dress and form is better than ever before and will be welcomed by students and teachers and all interested in the nursing profession.

The printing and make-up are excellent. The illustrations are well chosen, abundant, and many of them are beautifully done in colors. A good example of these is found in those depicting the anatomy of the neck with the blood vessels in their proper colors.

Beginning with its first edition this book has always maintained a prominent position, and this 10th edition will be not only a joy to its old friends, but will appeal to new readers wherever teaching of nurses is carried out.

ELEANOR KEELY

Appertizing or The Art of Canning
—By A. W. Bitting, M.D. New York: The Glass Packer (11 West 42nd Street), 1937. 852 pp. Price, \$7.00.

Besides full familiarity with existing literature on the subject, the preparation of a complete and reliable text on canning requires specialized and practical knowledge which can be acquired only by long and close association with the canning industry. Therefore, on the rare occasions when a new book on canning is announced, the question logically arises as to whether the author is qualified to deal authoritatively with his subject.

However, in the case of this book, it is questionable whether any one individual now associated with the canning industry is better qualified than the author to cover the various phases of canning presented in the text. The name of Dr. Bitting—as well as that of his late wife, Katharine Golden Bitting—has been long and favorably known both to canners and to workers in the field of canning technology. Individually, and as a research team, their contributions are well known to workers in their field. This review would not be complete without a further word concerning the author.

The author's experience has included research on foods in Experimental Stations, in the Bureau of Chemistry, in the Research Laboratory of the National Canners Association, and as director of research for the Glass Container Association. During the World War he served in France in the planning branch of the Quartermasters Corps. In the course of his work as consultant, he was selected as adviser on food exhibits to A Century of Progress Exposition. It is from the wealth of experience gained from such close and varied relations with the canning industry that the author's present complete and constructive contributions to the rather limited literature on canning has been made.

The book, "Appertizing"—whose title is coined from the name of the discoverer of the principle of canning—constitutes a veritable "gold mine" of information on commercially canned foods, not only for practical canners, but for students of food technology, health officers, and food regulatory officials, as well. The amount of space allotted to this review will permit only a limited description of the organization and contents of the book.

The text is organized into a number of major sections, the first of which—dealing with historical aspects—is from

the pen of Mrs. Bitting. In this section, comprising some 117 pages, are collected in their original forms historic patents and papers relating to canning dating forward from the time of Appert. This is a unique feature of the book in that no previous publication has brought together in one place, for example, the original papers of Prescott, Underwood, MacPhail, Russell, and Barlow, which in their entirety laid the foundations for the modern science of canned food microbiology.

The remainder of the book is devoted to the canning of foods, the major sections dealing with the packing of fruits, vegetables, specialty products (spaghetti, etc.), milk, meats and allied products, fish and sea foods. The various products are discussed alphabetically within the particular sections into which they fall. Each discussion on any specific canning procedure contains valuable detailed information, consequently it is difficult to indicate here in a general way the nature of the details presented.

However, using corn as a specific example, some of the major items discussed might be described. After covering the botanical position and origin of corn, the varieties commonly used for canning, the early history of corn canning in America and the production figures for corn since 1912, the author first passes to chemical and physical changes in corn during development and after harvesting; then to the U. S. Standards (1935) for sweet corn for canning; and finally to the details of the packing procedure. Other useful points of information are also included such as the Bureau of Agricultural Economics Standards for Cream Style and Whole Grain Corn; Service and Regulatory Announcements affecting canned corn (under the Act of 1906); and common difficulties encountered in canning. This résumé will indicate the thoroughness with which the author

treats the technological and practical aspects of his subject.

The major suggestion which might be made for improvement of the text relates to the organization of the index rather than to the contents of the book. The index is not as complete as might be desired in a volume of this size. While alphabetical listing is employed for products included in the various sections on canning procedures, the reader's convenience would have been better served by a more complete cross-indexing of the text, particularly when a specific point of information is desired.

As offered to the reader, however, "Appertizing" should prove a valuable addition to the libraries of persons who deal either intimately or only occasionally with commercially canned foods. It is recommended without hesitation to all workers in the field of public health who have need of a reliable reference text of this character.

F. F. FITZGERALD

Facts About Food—By S. Henning Belfrage, M.D. New York: Oxford University Press, 1938. 177 pp. Price, \$1.50.

This is a popular little book on diet by an English physician, who writes interestingly and authoritatively about the various functions of food in the body and the best uses of various food-stuffs for well balanced and economical diets. The book is well printed, but has no index. It should be of value to the general reader.

JAMES A. TOBEY

The Health Program in Small Associations—By Edith M. Gates. New York: Womans Press, 1936. 57 pp. Price, \$.65.

This is a discussion as to the set-up of health programs in small Y.W.C.A.'s. It discusses the type of organization that would be advantageous. It has a

section on health education and the type of lectures and projects that are advisable; one on physical education sketching the activities of gymnasium classes and individual work in such activities as swimming, tennis, bowling, tap dancing, and the like; and one on recreation, either tied up with the physical education program, or aside from it. At the end is an 8 page bibliography. CHARLES H. KEENE

Marihuana: America's New Drug Problem—By Robert P. Walton. Philadelphia: Lippincott, 1938. 223 pp. Price, \$3.00.

This is an authoritative discussion of the scientific uncertainty and scholastic ignorance which surround the resinous exudate of the hemp plant. The author has chosen to call this marihuana, though he does not tell us why. Among several pages of alternative titles, this one is described as "the name given the weed in Mexico and the Latin American countries" (but would the Spanish peoples use that letter h?) and it is derived from "maraguango" meaning any substance producing an intoxication.

The one thing certain about the history of our subject is that hemp was a reasonably common plant in various pre-Christian civilizations. But as soon as one authority has theories regarding its early use another authority seems to disapprove. Creighton thought that the grass ("hashish") on which Nebuchadnezzar fed was hemp, and that the first chapter of Ezekiel was written by a marijuana addict. Most of us would have accepted his suggestion were it not that Dr. W. C. Graham who teaches Old Testament at the University of Chicago finds these theories unconvincing. De Sacy's theory that Assassins were originally hashish eaters has many apologists among the pamphleteers and has been naïvely accepted by the *Encyclopaedia Britan-*

nica; but there are other philologists who doubt.

Some say that marijuana causes addiction. Others say not. Dr. Walton is convinced that "there is a certain degree of addiction when this drug is smoked for an extended period of time." There is no doubt that men commit crimes while under the influence but it is seldom easy to decide whether the crime was planned before taking the drug or was committed without premeditation. The pathology is unknown and even the pharmacology has its doubtful points. For instance 22 c.c. of fluid extract did not kill a 40 lb. dog but 10 c.c. more rapidly injected did do so. No one knows whether the dog died from cannabinal, or alcohol, or precipitated resin. Modestly included in the pharmacological research is an item which on consulting reference number 417 in the bibliography turns out to be work done by the author himself and published in 1938.

Whether the effects of taking hashish are aphrodisiac, whether they are even pleasant, is a matter on which experiences do not accord. Dr. Walton points out that Dumas's famous description of a voluptuous fantasy in *The Count of Monte Cristo* "has never been incriminated in the development of any hashish addiction." This fact he adduces in support of his thesis that literature has little or no influence on the propagation of this sort of vice. Perhaps there are other readers, like myself, who do not feel themselves seduced by those marble goddesses with their breasts of ice and their burning mouths.

What can be done? Dr. Walton tells how the police in New Orleans have, by arrests and seizures, forced up the price of marijuana cigarettes to 30 or 40 cents each. He believes they can be made even more expensive. But he is not over-optimistic: "... the vice still

flourishes in every country in which it has once been established. This is despite the fact that, in some of these countries, attempts have been made for almost 1,000 years to stamp out the practice." J. ROSSLYN EARP

Health Insurance with Medical Care: The British Experience—*By Douglass W. Orr, M.D., and Jean Walker Orr. New York: Macmillan, 1938. 271 pp. Price, \$2.50.*

Out of the plentiful accounts on the British Health Insurance system, which include elaborate reports of two Royal Commissions and numerous technical documents, comes the Orr book, the first thoroughly readable and enjoyable account of the subject.

At the outset they state that "The English scheme is neither . . . centralized nor . . . simple." With the National Health Insurance, the main theme, they clearly weave into the pattern the important services such as public medical services, public assistance medical care, and voluntary contributory insurance that comprise the English health insurance system.

According to the Orrs, public health work in the medical inspection of school children and maternity and child welfare work, marked one of the major steps in the drive for health legislation in England. It has been pointed out that National Health Insurance is restricted in scope through its failure to provide specialist and hospital services, and care for dependents of insured persons. Nevertheless, the scope of public health work, which also includes many welfare activities, is such that "theoretically no one in England need go without medical care." These services are further implemented by numerous medical agencies, so that practically 40 per cent of the entire population and 80 per cent of gainfully employed persons are covered.

The network of medical services available to the English people is described succinctly and well. The Orrs' belief in the effectiveness of these services is perhaps too rosy when one considers health conditions in the slums of London, Manchester, and Birmingham. Their sample of physicians' incomes is equally idealized.

In their desire to learn what the English people think of health insurance, the Orrs went directly to the "producers"—the practising physicians, officers of the British Medical Association, and government officials—and the "consumers" of medical services. There is a unanimity of approval in both groups, even that the services should be extended. In light of the repeated assertions on the part of the American Medical Association to the contrary, this testimony is significant.

JOSEPH HIRSH

The Professional Secret in Social Work—*By Rev. Walter McGuinn, S.J., Ph.D. Boston: Boston College School of Social Work, 1938. 34 pp.*

The author presents a framework of moral principles calculated to guide the social worker in the solution of problems rooted in the social work secret. Consideration is given to natural, promised, and entrusted secrets, including the professional character of relationships with clients. Among the several conclusions, it is indicated that the obligation ceases when the preservation would cause serious harm to the community, and the Social Work Secret must be revealed when the preservation would jeopardize public peace, public health, public morals, or public welfare. But in solving a concrete case of conflicting rights and duties, the benefit of the doubt to the client must call for a preservation of the secret unless there is a clear necessity of making the revelation.

IRA V. HISCOCK

BOOKS RECEIVED

- THE NATURAL HISTORY OF POPULATION. By Raymond Pearl. New York: Oxford, 1939. 416 pp. Price, \$3.50.
- LANDMARKS IN MEDICINE. Laity Lectures of the New York Academy of Medicine. New York: Appleton-Century, 1939. 347 pp. Price, \$2.00.
- HEALTH AT FIFTY. Edited by Dr. William H. Robey. Cambridge: Harvard University Press, 1939. 299 pp. Price, \$3.00.
- SOILLESS GROWTH OF PLANTS. By Carleton Ellis and Miller W. Swaney. New York: Reinhold, 1938. 155 pp. Price, \$2.75.
- ECONOMICAL ADMINISTRATION OF HEALTH INSURANCE BENEFITS. Washington: International Labor Office, 1938. 332 pp. Price, \$1.75.
- EVALUATION OF THE INDUSTRIAL HYGIENE PROBLEM IN THE STATE OF TEXAS. By George W. Cox. Austin: Texas State Department of Health, 1939. 46 pp.
- PRINCIPLES OF HEALTH EDUCATION. By C. E. Turner. 2nd ed. New York: Heath, 1939. 335 pp. Price, \$2.00.
- TAKING CARE OF THE FAMILY'S HEALTH. A Teaching Guide for Rural Classes. By Elma Rood and Gertrude Lingham. Madison College, Tenn. Rural Press, 1938. Two book edition in paper, \$5.00. Two book edition in flexible fabricoid, \$6.50.
- THE LIFE OF CHEVALIER JACKSON. An Autobiography. New York: Macmillan, 1939. 229 pp. Price, \$3.50.
- AN INTRODUCTION TO MODERN STATISTICAL METHODS. By Paul R. Rider. New York: Wiley, 1939. 220 pp. Price, \$2.75.
- SOCIAL WORK YEAR BOOK, 1939. Russell K. Kurtz, Editor. Fifth issue. New York: Russell Sage, 1939. 730 pp. Price, \$3.50.
- PHYSICAL EDUCATION IN THE ELEMENTARY GRADES. By Strong Hinman. New York: Prentice-Hall, 1939. 523 pp. Price, \$2.00.
- THE ADMINISTRATION OF HIGH SCHOOL ATHLETICS. By Charles E. Forsythe. New York: Prentice-Hall, 1939. 413 pp. Price, \$2.00.
- POPULATION, RACE AND EUGENICS. By Morris Siegel. Published by the author, Hamilton, Ontario, 1939. 206 pp. Price, \$3.00.
- OCCUPATIONAL DISEASE SYMPOSIUM. Northwestern University Medical School. Department of Industrial Medicine. Chicago, 1939. 99 pp. Price, \$3.00.
- SURVEY OF NATIONAL NUTRITION POLICIES 1937-1938. League of Nations. New York: Columbia University Press, 1938. 120 pp. Price, \$60.
- PROCEEDINGS OF CONFERENCE ON BETTER CARE FOR MOTHERS AND BABIES, WASHINGTON, D. C. January 17 and 18, 1938. Washington: Government Printing Office, 1938. 171 pp. Price, \$20.
- PLAY SPACE IN NEW NEIGHBORHOODS. A Committee Report on Standards of Outdoor Recreation Areas in Housing Developments. New York: National Recreation Association, 1939. 23 pp. Price, \$25.
- FUNDAMENTAL PRINCIPLES OF BACTERIOLOGY WITH LABORATORY EXERCISES. A. J. Salle. New York: McGraw-Hill, 1939. 679 pp. Price, \$4.00.
- YOUR HEALTH DRAMATIZED. (Selected Radio Scripts.) By W. W. Bauer and Leslie Edgley. New York: Dutton, 1939. 528 pp. Price, \$2.25.
- ADEQUATE FAMILY FOOD ALLOWANCES AND HOW TO CALCULATE THEM. Prepared by the Social Welfare and Public Health Department of the American Home Economics Association with a representative from the American Dietetic Association. New York: Family Welfare Association of America, 1939. 35 pp. Price, \$40.
- VITAMINS AND VITAMIN DEFICIENCIES. By Leslie J. Harris. Vol. I. Introductory and Historical Vitamin B, and Beri-Beri. Philadelphia: Blakiston, 1938. 204 pp. Price, \$2.50.
- ECONOMIC ASPECTS OF MEDICAL SERVICES. By Paul A. Dodd and E. F. Penrose. Washington: Graphic Arts Press, 1939. 499 pp. Price, \$3.75.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Dental Abnormalities and Syphilis—Are "Hutchinson's teeth" pathognomonic of congenital syphilis? Are defects of teeth other than the upper incisors equally suggestive? Can defects of enamel from other causes than syphilis be clearly differentiated? Answers to these questions are sought for, and some good photographs are included which will be of interest.

ANDERSON, B. G. Dental Defects and Congenital Syphilis. *Am. J. Dis. Child.* 57, 1:53 (Jan.), 1939.

American Failures and Successes—As told to an international group in Scotland, our recently adopted National Health Program sounds most promising. At any rate it will do American sanitarians good to look at the picture of public health administration a-la-U. S. A., as displayed for the edification of others.

BAUMGARTNER, L. Recent Developments in Public Health in U. S. A. *Medical Woman's J.* 46, 1:21 (Jan.), 1939.

Childhood Conditions Causing Deafness—Experience is reported which leads to the conclusion that if school children in the primary grades were examined with a nasopharyngoscope at least once each year and those with lymphoid tissue about the eustacean tubes were treated with radiation, half the deafness in the next generation could be prevented.

CROWE, S. J., and BAYLOR, J. W. The Prevention of Deafness. *J.A.M.A.* 112, 7:586 (Feb. 18), 1939.

Do Nurses Influence Health Behavior?—We say, glibly enough, that the public health nurse is the teacher of hygiene in the home, the health educator *par excellence*, the mentor of the

family in matters of household hygiene. But is she? Is she equipped from the standpoints of adult education, applied psychology, or physiology to meet all our assumptions? To find out, competent stenographers were sent into the homes with the nurse to record what transpired. How, and how not, to teach are pointedly illustrated by some swell snatches of conversation between nurse and client. They must be read in their entirety.

DERRYBERRY, M. How May the Nurse Become a Better Teacher? *Health Officer.* 3, 9:253 (Jan.), 1939.

A Con Is Heard—Our British cousins, who delight in understatement, would characterize this as a rather forceful criticism of the recently proposed National Health Program. The author asserts that the public health services are not only not grossly inadequate, but that, on the contrary, we are at the very zenith of progress toward national health; that the sick poor receive a high quality of medical care; and that health departments should have nothing to do with services for the indigent sick. This paper is upon one of those topics about which each will want to make his own annotation.

EMERSON, HAVEN. Signs of the Times in Public Health. *J.A.M.A.* 112, 8:737 (Feb. 25), 1939.

Body Build and Birth Canals—Health workers in the field of maternal and infant hygiene will find much of value in these pelvimetric studies which demonstrate that a properly "normal" female pelvis occurs in less than a third of the women studied. The rest bore an embarrassing resemblance to the primitive pelvises supposed to be found only in Hottentots and Bushwomen.

Others than hygienists will be interested in the study because it shows how uncritically we take for granted any misinformation that has become bearded with moss.

GRUELICH, W. W. A Study of Pelvic Type. *J.A.M.A.*, 112, 6:485 (Feb. 11), 1939.

Is a Man as Old as His Arteries?—This paper is notable as an attempt to put to scientific test a hygienic "old saw." Let us hope that this effort will stimulate a whole epidemic of similar studies. "A man is as old as his arteries" is the overworked axiom subject to scrutiny. The tensile strength of the aortas of young and old rats and of rats subjected to alcohol and other health hazards was determined. It would not be fair to retail all the findings here, for the paper should be read, if only for its pioneering values.

HUME, J. F. The Tensility of the Rat's Aorta as Influenced by Age, Environment, Temperature, and Certain Toxic Substances. *Am. J. Hyg.*, 29, 1:11 (Jan.); 1939.

Mental Health in Child Hygiene—Reported upon is a 2 year study in preparing nurses to help mothers understand child development, and to help them anticipate and prevent undesired mental habits in their children (not to treat existing mental problems). An adviser in parent-child relationships spends a day or two in the field with each child hygiene nurse, after the nurse has become familiar with the principles of mental hygiene.

LEVY, J. An Experiment in Training Nurses to Help Mothers in Preventive Mental Hygiene. *Ment. Hyg.*, 23, 1:99 (Jan.), 1939.

Pneumonia in the North—In this series of Canadian papers upon epidemiology and treatment of pneumonia there seems to be no marked divergence from the findings reported on this side of the border, but public health administrators will find some useful comparisons here with local experience.

McKAY, A. L., *et al.* Epidemiology and Etiology of Pneumonia (and four other papers). *Canad. Pub. Health J.*, 30, 2:69 (Feb.), 1939.

A Hundred Million Dollar Industry—In this excellent statement of the problem of caring for the mentally sick, which is intended for the educated laity, health workers will find much of interest. A plea is made for more mental hygiene in our new National Health Program.

OVERHOLSER, W. Mental Hygiene—a Challenge. *Sci. Month.*, 48, 3:203 (Mar.), 1939.

Metabolic Disturbances and the Wassermann—False-doubtful and false-positive results are obtained from the sera of non-syphilitic but tuberculous blood donors, so it is evident that tuberculosis toxemia *may* add a confusing factor to syphilis serology. It is evident from this study, however, that it need never create a major difficulty in serodiagnosis.

PARRAN, T., and EVERSON, K. The Effect of Tuberculosis on the Serological Reactions for Syphilis. *Am. Rev. Tuberc.* 39, 11:1 (Jan.), 1939.

Skin Cancers Versus Internal—It appears that sailors in the U. S. Navy have a higher percentage of exposed cancers (due to the skin irritants, sun, salt water, and wind) and fewer internal cancers than the comparable civil population. If irritation chooses the organ to be attacked, providing the body is disposed, it might be possible to change the distribution of cancer in the direction of accessibility of treatment. Perhaps the well known hazard of sun and salt water is really a boon to the sailor.

PELLER, S., and STEPHENSON, C. S. Cancer in the United States Navy. *Am. J. Hyg.* 29, 1:34 (Jan.), 1939.

Children's Food—Scandinavians took a great step in school child nutrition when, instead of a hot noonday

luncheon, they were persuaded to substitute the now world-famous "Oslo Breakfast," served first thing in the morning. It consists of whole wheat or rye bread, cheese, milk, reinforced margarine, and half an apple, or substitute. In the article is a great deal about the vitamins, and calcium and iron. Concluding is a covenant of faith.

ROSE, M. S. Nutrition and the Health of the School Child. *Am. J. Dietetic Assoc.*, 15, 2:63 (Feb.), 1939.

Protecting Students in Institutions—Instead of being almost universal, the incidence of tuberculous infection in our present younger generation is less than half. The most exposed groups are medical students and nurses in training. Much of these infections could be prevented and the institutions should be obligated to protect these young people.

SOPER, W. B., and AMBERSON, J. B. Pulmonary Tuberculosis in Young Adults. *Am. Rev. Tuberc.*, 39, 1:9 (Jan.), 1939.

Health for 78,000 Farm Families—More than 600,000 low-income farm families receive financial aid from the Farm Security Administration. On the assumption that loans will be repaid more readily if borrowers are well, the federal agency has arranged through local medical societies for prepaid medical services. The scheme has been extended over 13 states and agreements have been reached with state medical associations in 7 others.

WILLIAMS, R. C. Medical Care Plans for Low-Income Farm Families. Health Officer. 3, 9:245 (Jan.), 1939.

Births and the Wee Sma' Hours—Stillbirths and neonatal mortality rates are higher among children born between noon and midnight than during the other half of the day: between 3 and 6 in the afternoon is the worst time. Operative deliveries are highest then, too.

VERUSHALMY, J. Hour of Birth and Stillbirth and Neonatal Mortality Rates. *Child Development*. 9, 4:373 (Dec.), 1938.

ASSOCIATION NEWS

SIXTY-EIGHTH ANNUAL MEETING

Pittsburgh, Pa.

October 17-20, 1939

HEADQUARTERS — HOTEL WILLIAM PENN

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

Ernest L. Berry, M.D., Box 343, Buhl, Idaho, Administrator, South Central Unit
Charles B. Billington, M.D., C.P.H., P. O. Box 445, Richmond, Ky., Madison County Health Officer
Hugh G. Clark, M.D., County Health Dept., La Fayette, Ala., Chambers County Health Officer
Valentine S. Duff, 8 Smith Rd., Hingham, Mass., Executive Health Officer
Littleton H. Eubanks, M.D., Lexington, Miss., Holmes County Health Officer
Thomas K. Fairey, M.D., 17 Edisto St., Johnston, S. C., County Health Officer
Robert S. Genduso, 654 Broadway, West New York, N. J., Health Officer
William B. Harrell, Jr., M.D., Box 332, Jonesboro, Ark., Craighead County Health Officer
Paul J. Jakmauh, M.D., 449 Eliot St., Milton, Mass., State Commissioner of Public Health
Festus E. Kitchens, M.D., 2506 Ponce de Leon, Coral Gables, Fla., Health Officer
C. A. Lusk, M.D., Walton Bank Bldg., Butler, Mo., Deputy State Health Commissioner for Bates County
Paul G. Martel, City Hall, Chicopee, Mass., Agent, Health Dept.
John G. McNiel, M.D., Christiansburg, Va., Montgomery County Health Officer
Lewis A. Nimmons, M.D., Bishopville, S. C., County Health Officer
Herman W. Schweizer, M.D., Fort Hall Agency, Fort Hall, Idaho, Agency Physician, U. S. Indian Service
Richard N. Sherwin, M.D., Court House,

Hillsboro, Ore., Washington County Health Officer
Leigh A. Simpson, M.D., 11 S. 3rd, Fulton, N. Y., Health Officer
Clarence G. Thompson, M.D., Disco Bldg., Norwich, Conn., Health Officer
Francis B. Wishart, M.D., D.P.H., 21 George St., Campbellton, N. B., Canada, District Medical Health Officer
George C. Wood, M.D., Ft. Belknap Hospital, Harlem, Mont., Senior Physician, U. S. Indian Service
Jack Woodward, M.D., D.D.S., Hoopa, Calif., Senior Physician, U. S. Indian Service

Laboratory Section

Michel Ciuca, M.D., 8 Ave. de France, Geneva, Switzerland, Professor of Bacteriology, University of Iasi, Iasi, Roumania —on leave
Sidney C. Dalrymple, M.D., Newton Hospital, Newton Lower Falls, Mass.
Victor H. Dietz, D.D.S., University of Illinois, Chicago, Ill.
Leon P. Eisman, 353 Massachusetts Ave., Cambridge, Mass., Student
Lloyd R. Jones, Ph.D., 1402 S. Grand Ave., St. Louis, Mo., Assistant Professor of Bacteriology and Chairman, Dept. of Bacteriology, St. Louis University School of Medicine
Cornelius B. Kelly, Jr., 65 W. Sunrise Highway, Freeport, N. Y., Assistant Sanitary Chemist, N. Y. Conservation Dept., Bureau of Marine Fisheries
Emily E. McComb, Ph.D., South St., Suffield, Conn.

Francis Mills, State Hospital for Epileptics,
Wahjamega, Mich., Bacteriologist
Lucy J. Watt, Western College, Oxford, O.,
Teacher of Bacteriology

Vital Statistics Section

Huldah Bancroft, 1820 E. Monument St.,
Baltimore, Md., Instructor in Biometrics,
Western Reserve University Medical School
—on leave
Clyde A. Bridger, 1306½ N. 6 St., Boise,
Idaho, Vital Statistician, State Division of
Public Health
Harry F. Downes, Court House, Jersey City,
N. J., Chief Statistician, Hudson County
Board of Health
Alfhild Vold, 1304 Washtenaw Terrace, Ann
Arbor, Mich., Student

Public Health Engineering Section

Thomas P. Anderson, 172 N. Broughton St.,
Orangeburg, S. C., Sanitarian, County
Health Dept.
John Andrews, 125 Brooks Ave., Raleigh,
N. C., Assistant Engineer, State Board of
Health
Jacob M. Beckerman, 425 S. Division, Ann
Arbor, Mich., Student
Floyd L. Berry, City Hall, Dalton, Ga., Sani-
tarian, State Dept. of Public Health
Bruce Brownson, City Hall, Grand Junc-
tion, Colo., Chief, Dept. of Health and
Parks
Sidney H. Gold, 269 Winthrop Ave., New
Haven, Conn., Student
Julius C. Hedden, Box 345, Laurens, S. C.,
Sanitarian, District Health Dept.
Alvin F. Meyer, Jr., Rm. 354, Virginia Mili-
tary Institute, Lexington, Va., Student
Sanitary Engineer
Ralph J. Van Derwerker, Court House
Annex, Elizabeth, N. J., Supt., Union
County Mosquito Commission
Noall E. Walter, P. O. Box 483, Provo, Utah,
Sanitarian, State Board of Health

Industrial Hygiene Section

Murray B. Ferderber, M.D., 5722 Fifth Ave.,
Pittsburgh, Pa., Research Fellow, Dept. of
Industrial Hygiene, University of Pittsburgh
Kenneth E. Markuson, M.D., C.P.H., Her-
man Kiefer Hospital, Detroit, Mich., As-
sistant Director, Bureau of Industrial
Hygiene, State Dept. of Health
Carl M. Peterson, M.D., 535 N. Dearborn
St., Chicago, Ill., Secretary, Council on
Industrial Health, American Medical Assn.

Food and Nutrition Section

William B. Esselen, Jr., Ph.D., Owens-
Illinois Glass Co., Toledo, O., Food and
Nutrition Research Worker

B. Alene Theisner, 704 New Center Bldg.,
Detroit, Mich., Director, Dairy Council of
Detroit

Public Health Education Section

Rosabel Burch, 14 W. 49 St., New York,
N. Y., Health and Safety Adviser, Girl
Scouts, Inc.
Agnes M. English, 81 Howe St., New Haven,
Conn., Student
Mary L. Heaton, 70 Dubois St., Newburgh,
N. Y., Executive Secretary, Newburgh
Public Health and Tuberculosis Assn.
Leonard W. Hines, M.D., 816-4 St., Santa
Rosa, Calif.
Wilhelm O. Johnson, 145 State St., Spring-
field, Mass., Executive Secretary, Hampden
County Tuberculosis and Public Health
Assn.
Stella O. Kline, Rm. 801, Court House,
Elizabeth, N. J., Executive Secretary,
Union County Tuberculosis League
Inez G. Peyton, 200 E. Laurel, Fort Collins,
Colo., Supervisor of Health Education,
Public Schools
Thurman M. Rogers, M.D., 229 Main St.,
Sterling, Colo., Chairman, Public Health
Committee, State Junior Chamber of
Commerce
Gretta Wren, 14 State St., Ossining, N. Y.
Herbert L. Wright, M.D., Dr.P.H., City Hall,
Okemah, Okla., Director, Okfuskee County
Health Unit

Public Health Nursing Section

Ada M. Beerstecher, 25 E. Athens Ave., Ard-
more, Pa., Executive Secretary, Community
Health and Civic Assn.
Catherine E. Denning, 2512 Koppers Bldg.,
Pittsburgh, Pa., Local Field Supervisor,
Western Pennsylvania Nursing Area,
Metropolitan Life Insurance Co.
Mary J. Fee, 1516 W. Church St., Champaign,
Ill., County Public Health Nurse
Lily Hagerman, R.N., 130 State Capitol Bldg.,
Salt Lake City, Utah, Director, Public
Health Nursing, State Board of Health
Heather Kilpatrick, P. O. Box 221, Duncan,
B. C., Canada, Supervisor, Cowichan
Health Centre
Anne H. McCabe, 9 Cobb Ave., White Plains,
N. Y., Director, Division of Public Health
Nursing, Westchester County Dept. of
Health
Edith F. McManus, Box 305, Lamar, Colo.,
Prowers County Public Health Nurse
Eleanor Palmquist, 1445 C St., Lincoln, Nebr.,
Consultant for Public Health Nurses, State
Dept. of Health
Marguerite Prindiville, 13 Lebanon Rd.,
Scarsdale, N. Y., Supervisor, Henry St.

Visiting Nurse Service

- Talitha M. Ritterbusch, District Health Unit,
Dexter, Mo., District Health Nurse
Hazel I. Ross, Hugoton, Kans., Public Health
Nurse
Mary B. Willeford, Ph.D., R.N., 2085 Sacra-
mento St., San Francisco, Calif., Nurse
Consultant in Maternal and Child Hygiene,
State Dept. of Public Health

Epidemiology Section

- Alfreda N. Bica, M.D., 55 Shattuck St.,
Boston, Mass., Health Officer of Brazil—
on leave
A. W. Deem, D.V.M., Colorado State College,
Fort Collins, Colo., Assistant Professor of
Pathology and Bacteriology
Walter C. Earle, M.D., Apartado 11, Cuerna-
vaca, Morelos, Mexico, Field Director,
International Health Division, Rockefeller
Foundation
John H. Fountain, M.D., 1636 Hudson St.,
Denver, Colo., Acting Director of Tubercu-
losis Control, State Dept. of Public Health
Howard D. Smith, M.D., 124 E. 2 St., Salida,
Colo., City Physician

Unaffiliated

- Warren W. Currens, Box 268, Little Falls,
N. J., Passaic Valley Water Commission
Florence Knapp, P. O. Box 143, Fort Bidwell,
Calif., Staff Nurse, U. S. Indian Service
Everett J. Olenick, M.D., 715 Forest Ave.,
Ann Arbor, Mich., Trainee, Illinois Dept.
of Public Health
Joseph P. Ritenour, M.D., 3 Old Main, State
College, Pa., Director, College Health
Service
Florence G. Sprague, Fort Bidwell Hospital,
Fort Bidwell, Calif., Health Nurse, U. S.
Indian Service

DECEASED MEMBERS

- V. H. Bassett, M.D., Savannah, Ga., Elected
Member 1912, Fellow 1923
J. Treichler Butz, M.D., D.D.S., Allentown,
Pa., Elected Member 1918, Fellow 1922,
Life Member 1934

- W. J. V. Deacon, M.D., East Lansing, Mich.,
Elected Member 1912, Fellow 1922
William R. Tracey, Ottawa, Ont., Canada,
Elected Member 1935, Fellow 1937
Joseph T. Brennan, M.D., Independence, Mo.,
Elected Member 1935
Pearson D. Brooker, D.D.S., Columbia, S. C.,
Elected Member 1938
William H. Doolittle, Bethlehem, Conn.,
Elected Member 1929
C. A. Earle, M.D., Desplaines, Ill., Elected
Member 1920
Martha O. Eckford, Sc.D., Columbus, Miss.,
Elected Member 1930
Frederick L. Fenno, M.D., New Orleans, La.,
Elected Member 1927
Thomas M. Fly, M.D., Little Rock, Ark.,
Elected Member 1936
Herman S. Gove, M.D., Jefferson City, Mo.,
Elected Member 1934
Leigh I. Holdredge, Oneonta, N. Y., Elected
Member 1937
William C. Hunsicker, M.D., Philadelphia,
Pa., Elected Member 1938
Daniel S. Latham, M.D., Auburn, R. I.,
Elected Member 1926
Samuel T. Lindsay, M.D., Rochester, N. Y.,
Elected Member 1934
Earl B. McKinley, M.D., Washington, D. C.,
Elected Member 1935
James J. Minot, M.D., Boston, Mass.,
Elected Member 1920
Zula L. Powell, R.N., Fort Worth, Tex.,
Elected Member 1928
Joseph C. Saile, M.D., Bloomfield, N. J.,
Elected Member 1920
Thomas J. Stanton, Wichita, Kans., Elected
Member 1930
Lucy P. Sutton, M.D., New York, N. Y.,
Elected Member 1936
William A. Taltavell, M.D., Redlands, Calif.,
Elected Member 1919
L. W. Hutchcroft, Madison, Wis., Elected
Member 1926
Barton T. McDowell, Bristol Centre, N. Y.,
Elected Member 1927
Rolla B. Stafford, M.D., Junction City, Kans.,
Elected Member 1935
Pearl C. West, M.D., Sedro Woolley, Wash.,
Elected Member 1927

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge.

Replies to these advertisements, identifying clearly the key number on the envelope, should be addressed to the American Public Health Association, 50 West 50th Street, New York, N. Y.

POSITIONS AVAILABLE

The U. S. Civil Service Commission announces examinations for:

Associate Public Health Nursing Consultant, \$3,200 a year

Assistant Public Health Nursing Consultant, \$2,600 a year, with U. S. Public Health Service, Treasury Dept.
and

Associate Medical Officer, \$3,200 a year (General Practice) with Veterans' Administration.

Applications must be on file not later than April 10, 1939 or April 13 for western states. Forms may be procured from any first-class post office or from the Civil Service Commission, Washington, D. C.

There is a vacancy in the position of assistant professor in the Department of Bacteriology, Hygiene and Preventive Medicine at Baylor University College of Medicine, Dallas, Texas. A man primarily trained as a bacteriologist, also in general public health who likes to teach, is sought for this position. Applicants may communicate with Hardy A. Kemp, M.D., Professor, relating experience and salary desired.

POSITIONS WANTED

HEALTH OFFICERS

Experienced public health executive; 10 years as full-time county health officer; 4 years as state commissioner of health, wishes administrative position of responsibility. A403

Unusually well qualified and experienced administrator, M.D., Johns Hopkins; M.P.H., Harvard; with broad experience in administering programs of medical care, is available. A404

Physician, M.D., Class A medical school; M.S.P.H., University of Michigan, 1937; now serving as district state health officer, seeks full-time city or city-county administrative position. A367

Well qualified physician, with C.P.H. from Johns Hopkins; experienced as school physician and in college teaching, will consider city or county administrative position or teaching and student health service. A383

Physician, M.D., Vanderbilt University; Dr.P.H., Johns Hopkins; experienced as epi-

demologist, health officer and professor of preventive medicine, seeks position as administrator or epidemiologist. A397

Physician, aged 30; M.D., University of Illinois; C.P.H., University of California; experienced as instructor in medicine and director of state Division of Epidemiology, desires position in communicable disease control or administration. A399

Physician, M.D., C.P.H., two years' experience as district health officer; prefers to do venereal disease control work or epidemiology. A345

Well qualified physician, completing course in public health at the University of Michigan, with special interests in tuberculosis and venereal disease control, seeks a responsible appointment. Excellent references. A406

Physician, M.D., University of Minnesota, 1927; M.S., Columbia University, 1937; special training in tuberculosis and venereal disease, and administrative experience in CCC camp, wishes position as health officer. A407

HEALTH EDUCATION

Health educator with excellent background of teaching experience in schools; M.S.P.H. from the University of Michigan in June; wishes a position where skill with educational sound film projection and other recognized technics will be appreciated. H405

Experienced director of health education, R.N. and college graduate, with excellent references, will consider health education or promotional position in the East. H408

LABORATORY

Physician, M.D., Northwestern; Dr.P.H., Johns Hopkins; broad experience in laboratory, teaching and epidemiological fields, will consider temporary position for summer, beginning in April, preferably in parasitology. M293

Physician, C.P.H., Harvard-Technology; experienced as bacteriologist and pathologist and director of state laboratories, desires position. L208.

Experienced bacteriologist, Ph.D., 1934, with teaching in research background, particularly in relation to sanitation, seeks position as director of laboratory or teacher. L370

NEWS FROM THE FIELD

NATIONAL CONFERENCE FOR COÖPERATION IN SCHOOL HEALTH EDUCATION

RECOGNITION of the opportunities for developing more comprehensive and better coördinated programs of school health education throughout the United States culminated in a 2 day conference of some 70 delegates of 40 national organizations at the Rockefeller Center, New York, in November, 1938. Preliminary plans for the conference were developed by representatives of the National Education Association, the U. S. Public Health Service, the American Social Hygiene Association, and the National Health Council. Reports from delegates gave a colorful picture of the variety of ways that different organizations operate, of the wealth of diversified services, of the many groups served, and of the difficulties which hinder full attainment of objectives.

Members of the conference stressed the importance of health education in the entire community and the desirability of interrelating school health education and public health education as parts of that whole. There are many national health and educational agencies already well organized for service in this field. From this preliminary conference there resulted a plan for the organization of a National Conference for Coöperation in School Health Education "To meet more effectively the recognized needs of the schools . . . for making the resources of those agencies more readily available through coördination of efforts."

An executive committee is in the process of organization, and operating codes have been tentatively drawn up for the guidance of the executive committee and of the National Conference composed of representatives selected by

the national agencies represented at the first Conference and others to be added. These plans will be submitted in the near future for the consideration of the participating agencies. The chairman of the Conference during these stages of organization is Professor Ira V. Hiscock of Yale University, President of the National Health Council. The secretary is N. P. Neilson, Ph.D., Field Secretary of the American Association for Health, Physical Education and Recreation of the National Education Association.

SOUTHERN CALIFORNIA PUBLIC HEALTH ASSOCIATION ELECTS OFFICERS

AT its recent Annual Meeting the Southern California Public Health Association elected the following officers:

President—Wilton L. Halverson, M.D., Pasadena

President-elect—C. Morley Sellery, M.D., Los Angeles

First Vice-President—Hyman I. Vener, M.D., Los Angeles

Second Vice-President—Charles R. Wylie, M.D., Ventura

Secretary-Treasurer—R. L. Kaufman, M.D., Riverside

BIRTH CONTROL AGENCIES MERGE

THE American Birth Control League and the Birth Control Clinical Research Bureau have merged to form the Birth Control Federation of America, following ratification by the League of the action of a joint committee presented at its 18th annual meeting in New York on January 18.

Dr. Richard N. Pierson, of New York, Chairman of the Joint Committee, was elected temporary President of the new Federation, and Mrs. Margaret Sanger was elected Honorary Chairman of the Board.

HYGIENE OF HOUSING COMMITTEE

THE regular spring meeting of the Association Committee on the Hygiene of Housing, under the Chairmanship of Professor C.-E. A. Winslow of Yale University, was held as a round table under the auspices of the Milbank Memorial Fund at the New York Academy of Medicine, March 23 and 24. On March 25 the Committee continued its discussion in New Haven at Yale University and at the Pierce Laboratory of Hygiene.

In addition to the 18 members of the Committee, and the staff attached to the Committee, other participants were W. H. Purnell, in charge of TVA research in house heating; Dr. Svend Riemer, a Swedish-German sociologist who conducted studies in Stockholm on family living habits as affected by the plan of the dwelling; L. M. Graves, M.D., Health Officer of Memphis; Henry F. Vaughan, Dr.P.H., Health Officer of Detroit; Coleman Woodbury, Director of the National Association of Housing Officials; J. I. Linde, M.D., Health Officer of New Haven; Huntington Williams, M.D., Commissioner of Health of Baltimore; Dr. Abraham Goldfeld, Director of the Lavanburg Foundation, and Mr. B. M. Pettit, Director of the New Haven Housing Authority.

THE WANGER HEALTH BILL

THE Wanger health bill, which has been referred to the Senate Committee on Education and Labor, is having the consideration of Senator Elbert D. Thomas of Utah, who has sent copies of the bill to all administrative agencies, asking for comments.

It is understood that hearings will be scheduled when these federal agencies reply, and it is reported that Senator Thomas will conduct the hearings himself before the whole Committee, and is not planning to appoint a sub-committee.

The Chairman is reported to be a scholar of some distinction, holding doctorates at four universities, and the Senate Committee on Education and Labor is an unusually able and socially minded group, who will give the National Health Program bill a sympathetic hearing. Other members of the Committee are: Senators David I. Walsh, James V. Murray, Vic Donahey, Rush D. Holt, Claude Pepper, Allen J. Ellender, Josh Lee, Lister Hill, William E. Borah, Robert M. LaFollette, Jr., James J. Davis, and Robert A. Taft.

NORTHERN CALIFORNIA PUBLIC HEALTH ASSOCIATION ELECTS OFFICERS

THE following officers for the year 1939 were elected by the Northern California Public Health Association at its annual meeting held on February 25th:

President—Louis Olsen, Palo Alto

President-elect—I. O. Church, M.D. Oakland

Vice-President—A. Frank Brewer, M.D., Fairfield

Secretary—Miss Margaret Blee, Berkeley

Treasurer—Miss Helen Hartley, Stockton

Representative on A.P.H.A. Governing Council—Guy S. Millberry, D.D.S., San Francisco

Alternate—Fred T. Foard, M.D., San Francisco

WESTERN UTAH TO HAVE PUBLIC HEALTH NURSING SERVICE

ARRANGEMENTS have been completed for a public health nursing service to be established in the Goshute Area in western Utah. The service will be financed by three agencies: Tooele County, Utah; the Utah State Board of Health; and the U. S. Indian Service—each paying one-third of the total cost.

Owing to the geographic isolation of this area, medical services have been very meager in the past. The nearest physician is about 100 miles from the center of the area, and the nearest hospital is at Ely, Nevada.

DECLARATION OF THE BALKAN MEDICAL UNION

THE Balkan Medical Union, in session at Istanbul (December, 1938),

having taken into consideration the terrible sufferings which a war will bring upon the civil population of open towns, together with the total lack of any adequate means of protection,

and having discovered that even in its restricted form the project of "sanitary towns" has not yet been adopted, and that all efforts made to protect civilians against chemical warfare have till now remained as proposals only, and that even the protocol prohibiting the use of asphyxiating gas has not yet been ratified by all nations,

has therefore decided to address itself to doctors of every nation with an appeal to take active measures and to fulfil this professional and humanitarian duty of awakening and stirring public opinion.

The Balkan Medical Union believes that only enlightened international opinion can make plain the imminence of the danger and the proved uselessness, even for the victor, of these terrible atrocities, and can thus lead to effective action.

The immutable truth that hate breeds only hate, and atrocity breeds vengeance must be impressed on everyone.

UNION MÉDICALE BALKANIQUE

22, Peyikhane caddesi, Istanbul

THE PROFESSIONAL CLUB—NEW YORK WORLD'S FAIR

THE Professional Club, an incorporated organization, will mark the first time in any international exposition that physicians and public health workers will occupy club quarters especially reserved for their use.

The Professional Club is to occupy an area of 5,000 square feet on the main floor of the exhibit building, with

a main entrance from the garden between the science and medical wings of the building, and another from the Hall of Man. Its lounge, designed by Franklyn Fischer, is a wide, kidney-shaped chamber, ultra-modern in its decoration and furnishings, and equipped with a bar. Around the long arc of the lounge there are to be glassed-in cases in which sponsors of exhibits in the Hall of Medical Science may make displays of their products.

Membership in the Professional Club is open to all accredited members of the American Medical Association and the American Public Health Association. All told, 300,000 members of national organizations in the medical and public health field will be eligible for professional membership in the club. In addition to physicians and surgeons, membership has been extended to dentists, health workers, pharmacists, veterinarians and nurses. Professional memberships will carry no dues, and the facilities of the club will be open only to professional members and accredited representatives of participating organizations whose financial support made possible educational exhibits in the building.

WEST VIRGINIA JOINS THE PROCESSION

ON February 27, West Virginia became the 11th state passing a measure which requires a doctor's certificate showing that neither applicant for a marriage license has syphilis in an infectious stage. The law goes into effect in 90 days.

It was sponsored by the West Virginia State Department of Health and endorsed by the Federation of Women's Clubs as well as the State Medical Society, State Nursing groups, State Conference of Social Work and the State Parent-Teachers Association. The bill is stated to have been opposed by a lobby of taxi-cab drivers and clergymen from West Virginia's Gretna Green.

1938 HEALTH CONSERVATION CONTESTS NEAR COMPLETION

THE Grading Committee will meet on April 12, to decide the awards to be given for the 1938 City Health Conservation Contest, the Rural Health Contest in both the United States and Canada, and the special competitions for programs designed to combat tuberculosis and syphilis. This year completes the tenth annual city contest, and the fifth rural contest.

Carl E. Buck, Dr.P.H., has stated that these annual health contests, conducted by the United States Chamber of Commerce in coöperation with the American Public Health Association, constitute the most effective tool thus far devised for stimulating active and intelligent lay interest in the furtherance of sound health protection and promotion services throughout the country. While the returns are still incomplete, it is certain that the 1938 results will be considerably in advance of those of preceding years. It has been estimated that the increase in effective participation in the rural counties will amount to approximately 40 per cent over the preceding year. The public press will carry the announcement of this year's reports on or about April 18.

GOVERNMENTAL INDUSTRIAL HYGIENISTS CONFERENCE

THE Second Annual Conference of Governmental Industrial Hygienists will take place immediately following the State and Territorial Health Officers meeting, and will extend over a 3 day period, April 26-28. It will be held in the Public Health Service auditorium, Washington, D. C.

PERSONALS

Central States

WILLIAM E. BUNNEY, PH.D.,* Director of the Biologic Products Division

of the Michigan State Department of Health, Lansing, for seven years, has resigned to become Director of Biologic Products for E. R. Squibb & Sons, New Brunswick, N. J.

J. F. D. COOK, M.D.,† has been appointed Superintendent of the South Dakota State Board of Health and Deputy Director of Vital Statistics.

GEORGE F. FORSTER, PH.D.,† of Lansing, Mich., who has been engaged in research on pneumonia for the Department during the past two years, has resigned to become Assistant Director of the Laboratories of the Illinois State Department of Health, Springfield.

DR. GEORGE H. HILTS, of Bowbells, N. D., has been appointed Health Officer of Burke County.

R. H. MARKWITH, M.D.,* of Akron, Ohio, has been appointed as State Director of Health, succeeding WALTER H. HARTUNG, M.D.,* Dr. Markwith has been Health Commissioner of Summit County, including the City of Akron, for the past 17 years.

DANIEL W. MEAD,* Consulting Engineer of Madison, Wis., and former President of the American Society of Civil Engineers, received the Washington Award for 1939. The Western Society of Engineers make this award each year upon recommendation of a commission representing engineers' associations. In 1936 the American Public Health Association presented Mr. Mead with a certificate in recognition of his 44 years of continuous membership.

RICHARD SEARS, M.D.,† Epidemiologist with the Michigan State Department of Health and recently Acting Director of the Muskegon County Health Department, has been appointed Director of Health District No. 5—including Lake, Newaygo, and

* Fellow A.P.H.A.

† Member A.P.H.A.

Oceana Counties—with headquarters in White Cloud. He succeeds GUY R. POST, M.D.,† resigned.

WILLIAM D. STOVALL, M.D.,* of Madison, Wis., has resigned as Chairman of the Committee on Cancer of the State Medical Society of Wisconsin, after ten years' service.

FRED O. TONNEY, M.D.,* formerly Assistant Commissioner of Health and Director of Technical Research in Chicago, Ill., has been appointed Medical Officer to the Federal Trade Commission, Washington, D. C., for work in connection with the Wheeler-Lee Act pertaining to false and misleading advertising of foods, drugs, cosmetics and health devices, which becomes effective June 30, 1939.

DR. HENRY P. WORSTELL, of Columbus, Ohio, has been appointed Assistant Supervisor of the Medical Section of the State Industrial Commission, succeeding DR. ROY J. SECREST, who resigned to enter private practice in Columbus.

Eastern States

VIVIAN DRENCKHAHN, M.S., C.P.H.,† who for several years has been health teaching consultant of the Buffalo Tuberculosis Association, New York, has resigned to accept a position in health education sponsored jointly by the Kellogg Foundation and the University of Michigan. Her work will be limited to the 7 county area served by the Foundation, and will include courses for teachers-in-service, curriculum construction work and special studies among children, under the direction of HENRY J. OTTO, PH.D., of the Kellogg Foundation.

DR. JOSEPHINE EVARTS, of Cornwall Bridge, Conn., has been appointed Health Officer of Kent, Conn.

DR. WALTER S. LAY has been appointed Health Officer of Hamden, Conn.

RAYMOND E. LEACH,* Bacteriologist in charge of the District Public Health Laboratory, Kansas State Board of Health, Parsons, Kans., has resigned to accept a position in the laboratory of the Cattaraugus County Department of Health, Olean, N. Y.

FREDERIC W. NORDSIEK † has resigned as Executive Secretary of the New York Diabetes Association, a position he has held on a part-time basis since last April when he became Associate in the Department of Nutrition of the American Institute of Baking, New York, N. Y.

LAURA M. LONG RIEGELMAN, M.D.,† for the past 19 years Chief of the Bureau of Child Hygiene in Brooklyn, N. Y., retired December 31, after 40 years of service with the New York City Department of Health.

THOMAS M. RIVERS, M.D.,† of the Rockefeller Institute for Medical Research, has been appointed a member of the Board of Health of New York City.

DR. REUBEN ROTHBLATT has been appointed Acting Health Officer of Willimantic, Conn., succeeding DR. NATHAN M. SPECTOR, resigned.

DR. HOWARD G. STEVENS, of New Milford, has been appointed Health Officer of Sherman, Conn.

HELEN STACEY has been appointed as Nutrition Consultant for the Henry Street Visiting Nurse Service. Miss Stacey served as Nutritionist for the American Telephone and Telegraph Company for the past 10 years and was responsible for the development of a nutrition program for the women employees of the Bell System. She has also served as Nutritionist for the American Red Cross and the Association for Improving the Condition of the Poor of New York City.

* Fellow A.P.H.A.

† Member A.P.H.A.

DR. PAUL I. YAKOVLEV, of Waltham, Mass., has been appointed Clinical Director of the Walter E. Fernald State School, Waverley.

Southern States

WOFFORD E. BALDWIN, M.D.,† formerly Health Officer of Chester, S. C., has been transferred to Oconee County, with headquarters at Valhalla.

WILLIAM H. BALL, M.D.,† of Tampa, Fla., has been appointed Director of the recently organized health unit in Franklin and Gulf Counties.

DR. WILLIAM B. BONES, formerly of Monteagle, Tenn., has been appointed Associate in Charge of the Division of Child Hygiene of the Alabama State Department of Health.

DR. HENRY BRANDON, of Yadkinville, N. C., has been appointed Health Officer of Yadkin County, succeeding DR. LOCKSLEY S. HALL.

DR. HERBERT E. CANNON, of Covington, La., has been appointed in charge of a new health unit to be established in St. Tammany Parish.

DR. ROBERT A. CLANTON, of Grenada, Miss., has been appointed Health Officer of Grenada County, succeeding the late DR. THOMAS J. BROWN.

DR. THOMAS W. COLLIER, of Lyons, Ga., has resigned as Health Commissioner of Toombs County, to engage in private practice in Port Arthur, Tex.

JOSEPH RIGNEY D'AUNOY, M.D.,† of New Orleans, La., has been appointed by the Louisiana State University Medical Center to serve as a member of the board of the Guidance Center of the New Orleans Institute of Mental Hygiene.

DR. LITTLETON H. EUBANKS,† of Lexington, Miss., Assistant Health Officer in Lauderdale County, Miss., has

been appointed in charge of the unit in Holmes County.

DR. ROBERT B. C. FRANKLIN, of Chapel Hill, N. C., has been appointed as Health Officer of Surry County, succeeding RALPH J. SYKES, M.D., resigned.

DR. THOMAS H. D. GRIFFITTS,† Director of the Henry R. Carter Memorial Laboratory of the U. S. Public Health Service, Savannah, Ga., has been appointed Acting City Health Officer.

DR. BENJAMIN F. HAND, JR., of Greenville, Miss., has been appointed Health Officer of Washington County.

GEORGE H. HAUSER, M.D.,† of New Orleans, La., has been appointed City Bacteriologist, succeeding the late WILLIAM H. SEEMANN, M.D.†

DR. JOHN H. HINES, of Atlanta, Ga., has been appointed Assistant Health Officer of Lauderdale County, with headquarters at Lexington, Miss., succeeding DR. LITTLETON H. EUBANKS.†

DR. WILLIAM H. KAEISER, of McAlester, Okla., has been appointed Health Superintendent of Pittsburg County.

NORRIS C. KNIGHT, M.D., C.P.H.,* of Clarksdale, Miss., has resigned as Director of the Coahoma County Health Unit, to take charge of the unit in Lauderdale County, with headquarters in Meridian.

ALBERT McCOWN, M.D.,† former medical director of the maternal and child health division of the Federal Children's Bureau, has been appointed Deputy Commissioner of the Michigan State Department of Health, effective February 1. Dr. McCown will direct the local health services of the department, aiding in coördinating the activities of the full time health departments and promoting the establishment of similar departments in the 24 counties not yet providing this service.

* Fellow A.P.H.A.

† Member A.P.H.A.

ROBERT S. MCGEACHEY, M.D.,† of Waldon, N. C., has resigned as Health Officer of Halifax County, to go to Craven County.

JOSEPH A. MORRIS, M.D.,† of Oxford, N. C., has resigned as Health Officer of Granville County, where he has served since 1919.

DR. THOMAS LON OWINGS, of Poplarville, Miss., is Acting Health Officer in Pearl River County, to relieve RANSOM J. JONES, M.D.,† Health Officer, who is on leave of absence for study at Johns Hopkins University, Baltimore.

DR. HENRY R. PERKINS, of Rockmart, Ga., has been appointed Health Officer of Abbeville and Laurens Counties.

DR. MAURICE C. PINCOFFS, Professor of Medicine at the University of Maryland and Instructor in Medicine at Johns Hopkins University, has been appointed a member of the Maryland State Board of Health. He succeeds DR. JOSEPH IRWIN FRANCE, who died recently.

GUY R. POST, M.D.,† of Holly Springs, Miss., Health Officer of Marshall County, has been appointed Director of the Coahoma County Health Unit, succeeding NORRIS C. KNIGHT, M.D., C.P.H.,* resigned.

BENJAMIN M. PRIMER, M.D.,* of Austin, Tex., has been appointed Director of the Travis County Health Unit, to succeed BOLIVAR J. LLOYD, M.D.,† resigned.

DR. DUDLEY A. REEKIE, of Louisville, Ky., Field Director of County Health Work in Kentucky, has been appointed Assistant City Health Officer of Atlanta, Ga.

MACK I. SHANHOLTZ, M.D.,† former health officer with the Health Unit in Bristol, Va., is now Director of the Commonwealth Fund Health

Unit located in Seminole County, Okla.

DR. MURPHY M. SIMMS has been appointed Director of the Vermilion Parish Health Unit, Abbeville, La., succeeding DR. BENJAMIN O. MORRISON,† who was assigned as Director of the Acadia Parish Unit, with headquarters at Crowley.

DR. JOHN W. SPIES has been appointed Dean of the University of Texas Medical School and Professor of Public Health. Dr. Spies was formerly instructor in surgery and pathology at Yale University and associate professor of surgery at Peiping Union Medical College.

RALPH J. SYKES, M.D., has been appointed health officer for Halifax County, N. C.

K. L. K. WAERING, M.D., formerly Director of Hadsden County, Florida, has been appointed to take charge of the Duval County Health Unit, with headquarters in Jacksonville.

WILSON C. WILLIAMS, M.D.,* Assistant Professor of Preventive Medicine and Public Health, Vanderbilt University School of Medicine, Nashville, Tenn., was recently reappointed State Health Commissioner.

Western States

DR. E. L. BERRY,† Director of the South Central District Health Unit, Idaho, has replaced DR. R. B. STUMP, who was granted an indefinite leave of absence. Dr. Berry has had a semester's training at the University of Michigan.

DR. GEORGE H. BISCHOFF, of Boise, Idaho, has been appointed temporary head of the Bannock County Health Unit, succeeding GLEN T. SMITH, M.D.,† resigned.

DR. DWIGHT M. BISSELL, of Pittsburg, Calif., has been appointed Health Officer in Monterey County, succeeding ROY M. FORTIER, M.D.,*

* Fellow A.P.H.A.

† Member A.P.H.A.

of Salinas, who has taken a leave of absence.

DR. BRYSON E. COX has been named City Health Officer of Coalinga, Calif.

DR. J. V. FOLEY, Director of the Bannock County Health Unit, Idaho, has replaced GLEN T. SMITH, M.D.,† who was granted an indefinite leave of absence. Dr. Foley has had one semester's public health training at the Harvard School of Public Health.

MAX B. McQUEEN, M.D.,† Director of the North Central District Health Unit, Idaho, has replaced MARION W. CASKEY, M.D.,† resigned. Dr. McQueen has had a year's public health training at the University of California.

HERBERT L. NEWCOMBE, M.D., M.P.H.,† Director of the Kootenai County Health Unit, Coeur d'Alene, Idaho, has replaced LESTER C. KROTCHER, M.D.,* who has assumed the duties of Director of Local

Health Administration. Dr. Newcombe has had a year's special training at the Harvard School of Public Health.

GLEN T. SMITH, M.D.,† of Pocatello, Idaho, has resigned to accept a hospital residency in Chicago, Ill.

DR. NORMAN F. SPRAGUE, of Los Angeles, Calif., has been appointed a member of the State Board of Health, succeeding Dr. GEORGE H. KRESS, of San Francisco, now Secretary of the California Medical Association.

FOREIGN

PROFESSOR W. H. HOFFMANN, M.D., of the Finlay Institute, Habana, Cuba, has been nominated Honorary Member of the Robert Koch Institute of Berlin.

Death

C. T. COULTER, M.D., health officer of Malone, N. Y., died recently.

CONFERENCES AND DATES

American Association for Social Security. New York, N. Y. April 7-8.

American Association of Anatomists. Boston, Mass. April 6-8.

American Association for the Advancement of Science. Columbus, Ohio. December 27-January 2. (December 27, 1940, Philadelphia, Pa.)

American Association of Industrial Physicians and Surgeons—24th Annual Meeting. With the American Conference in Occupational Diseases and Industrial Hygiene. Hotel Statler, Cleveland, Ohio. June 5-8.

American Association of Pathologists and Bacteriologists. Richmond, Va. April 6-7.

American Association of the History of Medicine. Atlantic City, N. J. April 30-May 1.

American Association on Mental Deficiency. Chicago, Ill. May 3-6.

American Congress on Obstetrics and Gynecology—sponsored by the American Committee on Maternal Welfare, Inc. Municipal Auditorium, Cleveland, Ohio. September 11-15.

American Home Economics Association—32nd Annual Meeting. Gunter Hotel, San Antonio, Tex. June 20-23.

American Library Association. San Francisco, Calif. June 18-24.

American Medical Association, 90th Annual Meeting. St. Louis, Mo. May 15-19.

American Pediatric Society. Sky Top, Pa. April 27-29.

American Public Health Association. 68th Annual Meeting. Hotel William Penn, Pittsburgh, Pa. October 17-20.

American Public Welfare Association. Buffalo, N. Y. June 20-22.

- American Society for Clinical Investigation. Atlantic City, N. J. May 1.
- American Society of Heating and Ventilating Engineers. Semi-Annual Meeting 1939 (Great Lakes Summer Meeting). Grand Hotel, Mackinac Island, Mich. July 4-6.
- American Standards Association. New York, N. Y. November 30-December 1-2.
- American Water Works Association—59th Annual Meeting. Ambassador Hotel, Chelsea Hotel, Atlantic City, N. J. June 11-15.
- Kentucky-Tennessee Section. Peabody Hotel, Memphis, Tenn. April 10-12.
- Canadian Section. Royal York Hotel, Toronto, Ont. April 12-14.
- Montana Section (following School for Water Works Operators, April 12-13). Park Hotel, Great Falls, Mont. April 14-15.
- Illinois Section. Urbana-Lincoln Hotel, Urbana, Ill. April 20-22.
- Indianapolis Section. Antlers Hotel, Indianapolis, Ind. April 25-26.
- Ohio Section. Van Cleve Hotel, Dayton, Ohio. April 27-28.
- Pacific-Northwest Section. Tacoma, Wash. May 18-20.
- Association of American Physicians. Atlantic City, N. J. May 2-3.
- Arizona Public Health Association. Phoenix, Ariz. May 5-6.
- Building Officials Conference of America. Detroit, Mich. May 1-5.
- California Sewage Works Association—11th Annual Spring Conference. Visalia, Calif. April 14-15.
- Chamber of Commerce of the United States of America—27th Annual Meeting. Washington, D. C. May 2-4.
- Civil Service Assembly—Eastern Regional Conference. Asbury Park, N. J. June 14-17.
- Conference of Governmental Industrial Hygienists—Second Annual. Washington, D. C. April 26-28.
- Connecticut Public Health Association. May.
- Florida Public Health Association. Jacksonville, Fla. December.
- Health Officers and Public Health Nurses—Annual Conference. Grand Union Hotel, Saratoga Springs, N. Y. June 27-29.
- International Association of Public Employment Services. New Orleans, La. April 11-13.
- International College of Surgeons—Biennial Assembly. Hotel Roosevelt, New York, N. Y. May 21-24.
- International Congress of Military Medicine and Pharmacy—Tenth. (First meeting of this Congress, organized at the close of the World War, in the Western Hemisphere.) Hotel Willard, Washington, D. C. May 7-15.
- May Day—Child Health Day. May 1. "The health of the child is the power of the nation."
- Michigan Public Health Association. Lansing, Mich. November 1-3.
- National Association of Sanitarians. Oakland, Calif. December.
- National Boys & Girls Week Committee. 1939 Observance: April 29-May 6.
- National Hospital Day. May 12.
- National Conference of Social Work. Buffalo, N. Y. June 18-24.
- National County Officers' Association. Ogden, Utah. July 17-19.
- National Education Association, and affiliated organizations. San Francisco, Calif. July 2-6.
- National Negro Health Week: April 2-9. Silver Anniversary Observance, April 1-30.
- National Recreation Congress—24th. Theme: "Recreation and Democracy." Boston, Mass. October 9-13.
- National Safety Congress and Exposition—28th. Atlantic City, N. J. October 16-20.
- National Tuberculosis Association.

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Malnutrition—A Challenge and an Opportunity*

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Milbank Memorial Fund, New York, N. Y.

THE title of our paper is taken from a paragraph in the report of a League of Nations Committee on the relation of nutrition to health, agriculture, and economic policy:

The malnutrition which exists in all countries is at once a challenge and an opportunity; a challenge to men's consciences and an opportunity to eradicate a social evil by methods which will increase economic prosperity.¹

We may not be directly concerned with the economic effects of our work, nor with its relationship to the campaign for social justice. Nevertheless it is inspiring to consider that in our efforts to deal with a serious health problem, we may be helping to bring about in this troubled world, greater and more widespread economic prosperity, and aiding in the eradication of one important cause of social unrest.

LAG BETWEEN SCIENTIFIC ADVANCES AND THEIR APPLICATION

Public health work has made great progress in the last fifty years because trained men and women have devoted their lives in the laboratory and the field to the study of its problems, adding little by little to our stores of knowledge. Too often the application of new knowledge for the benefit of the mass has been long delayed. The forces of inertia have perpetuated the use of technics and methods of work long after the addition of new knowledge should have rendered them obsolete, and public health programs are planned all too frequently by individuals who ignore the fact that our knowledge of problems and technics and our resources and equipment have advanced with the years.

The promotion of nutrition is a case in point. The great advances in the science of nutrition during the last 25 years have been applied only sparingly. The tax supported agencies entrusted with the care of the public

* Read at a Joint Session of the Child Hygiene and Food and Nutrition Sections of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 25, 1938.

health have been in this respect the victims of inertia and tradition. Methods used by the health and school authorities to detect malnutrition and to promote nutrition are very much the same as those applied a quarter of a century ago, and the problem remains vague and ill defined. Social agencies other than the health and school authorities have recognized the importance of a more precise knowledge of the problem and have attempted to apply to it the newer methods developed in the laboratories of biochemistry and physiology. The result is that we do not look to health agencies for advice and help on nutrition problems but to home economists and dietitians, the agricultural schools and land-grant colleges, and universities. These individuals and institutions deserve every credit, and their efforts should be encouraged by every possible means, but their partial capture of this important section of the public health field should not mean avoidance of responsibility by the health agencies.

METHODS OF APPRAISING NUTRITIONAL STATUS AT PRESENT IN USE

Let us subject the statement of the League's committee that malnutrition exists in all countries to some analysis. Certainly cases of pellagra, rickets, scurvy, and beri-beri still occur in large numbers in many countries. Apart from these recognized deficiency diseases we have very little definite information on the extent of malnutrition even in the most advanced countries. For some years several methods of arriving at estimates of the number of malnourished in any group have been at our disposal. First we may study the availability and cost of the foods required for an adequate diet within a community. This however ignores differences in dietary habits of the individuals forming the group. To avoid this error, dietary studies of

families and individuals may be made. While these are difficult and costly, they do yield information of value if properly carried out, but of limited value because the individual's state of nutrition does not depend solely on his diet. Another approach has been by way of anthropometric measurements. The deficiencies and limitations of this method have been described clearly in the literature.

Under another plan the adequacy of the diet is appraised by providing extra supplies of protective foods to one group and noting the improvement in height, weight, and physique of that group as compared to a control group.

The clinical examination is another common method of appraising nutrition. The results in this case depend so much on the individual's judgment based on his appreciation of a number of variable factors that, taken alone, it is of limited value for public health use. The fact that the results of the appraisal of identical groups by different clinicians often differ widely is a sufficient criticism.

While some of these methods require perfecting, and others provide only limited or indirect evidence of malnutrition, it would seem that there has been available in the past a series of methods which should have given a rough idea of the extent of the problem of malnutrition in the advanced countries. What use has been made of these methods to define the problem of malnutrition in this country?

EXISTING EVIDENCE OF MALNUTRITION IN THE UNITED STATES OF AMERICA

During the 4 years 1926-1930, surveys were conducted on the dietary habits of families in rural areas in 6 different states; all revealed varying amounts of undernourishment.² During the past 5 years this type of study has constantly shown nutritional impairment among a definite proportion

of the urban population. For example, in one survey³ among 748 low-income families, 21 per cent were found to be receiving diets with an average energy value more than 25 per cent below the accepted standard; while for an additional 25 per cent of the families, the caloric intake was 10 to 25 per cent too low. From the standpoint of diets low in certain essentials, the proportion of families was even higher.

Figures of substantially the same order were obtained in another survey⁴ by use of a different technic. Records of food consumption were collected by the U. S. Bureau of Labor Statistics, and the nutritive content of the diets analyzed by the Bureau of Home Economics. Of 897 families of employed workers, only 29 per cent had "Grade A" diets, while 45 per cent had "Grade B," and 26 per cent "Grade C" diets. "Grade A" diets provided "a generous margin of safety in all nutritional essentials"; "Grade B" diets met average minimum requirements with an uncertain margin of safety; while "Grade C" diets failed in one or more respects to meet average minimum requirements. One would expect to find among these families a large number of malnourished individuals in the 26 per cent ("Grade C") group, and a smaller number in the 45 per cent ("Grade B") group. Nearly 90 per cent of the Negro families in this study consumed "B" or "C" diets; the percentage was 70 among white families. This is evidence that there has been a serious nutrition problem in the areas (Pacific, Southern, and North Atlantic cities) in which those families live; it is not precise enough to enable us to select for attention the individual victims of malnutrition.

During the past 5 years at least 10 studies have demonstrated the beneficial effects of supplemental foods in

the diets of children, with the obvious inference that the previous dietary was inadequate. One such study⁵—the most recent—on 150 children for 1 year showed that those receiving a supplement made greater progress during the period of observation.

There have been numerous clinical studies of children to determine their state of nutrition. Roberts⁶ summarized 13 such investigations carried out between 1906 and 1924, each covering thousands of children. The average percentage adjudged by clinical evidence to be suffering from malnutrition was 22.3. In 1932 the Community Health Center in Philadelphia with an annual medical case load of almost 2,000 cases reported malnutrition among 35 per cent.⁷ In 1933 one-third of several hundred children in New York City were rated by clinicians as "poorly" or "very poorly" nourished.⁸ Among 28,000 white children from 6 to 15 years of age examined in 21 states from 1928 to 1932, 6 per cent were stated to be malnourished by clinical examination without reference to any standards of height and weight.⁹

In 17 investigations carried out between 1918 and 1924 with the weight-height ratio as a criterion of nutritional status, 32.7 per cent of the persons examined were adjudged to be malnourished.¹⁰ We may be sure that many malnourished children escaped this screen while a considerable number of well nourished were included. Of 5,000 white children from 6 to 9 years of age, examined during 1929 to 1933 in 6 widely scattered cities, 43 per cent were below their age and sex-group average in weight.¹¹ It should be borne in mind that the statistical averages so determined may not represent the desired standard since 22 per cent were well above this level.

The fact that some 4,000 persons are recorded as dying of pellagra every year in the southern states of this

country is further objective evidence as to the state of public nutrition.

IMPORTANCE OF RAISING STANDARDS

It is to be noted that most of the standards used in these studies relate to average or minimum requirements while modern teaching suggests that we should relate nutrition appraisal to optimum standards. We believe that the area between minimum and optimum requirements will become of increasing importance in future work on nutrition. Minimum requirements are those which prevent signs of nutritional deficiency detectable by the ordinary methods in common use. It is more than probable that there are signs of nutritional deficiency which escape attention at present but which the use of the new methods of appraisal will enable us to discern. Our aim should be not mere existence at just above the level of detectable nutritional deficiencies, but that abounding health and vitality for which human beings have hungered throughout the ages.

A number of leading nutrition experts have expressed the belief that the greatly increased use of the protective foods may constitute a means of attaining greater vitality and possibly longer life. The reported experiments of Sherman seem to point in that direction.

THE LATENT STATE

By analogy with known disease entities, we should expect to find a latent period before certain states of malnutrition declare themselves frankly. It is also probable that in the majority of instances these latent states may clear up with time. It might be argued that nothing need be done about them; but two considerations must be borne in mind. First, experience teaches that the best time to deal with any condition affecting the health of the individual is in its earliest stage, before it has

done any permanent damage. Second, if our standards are to provide a safe margin above the minimum, and if we would strive for abounding health rather than for a so-called normal existence on the lowest or average level, we cannot afford to neglect these latent states of malnutrition.

It will be noted that we regard the improvement of nutrition as a medical problem, and the detection of latent states of malnutrition as one of the most important tasks of health agencies. The introduction of precise and objective methods offers a fresh opportunity of appraising nutrition. In what measure are we equipped to carry out that task? In recent years the science of nutrition has so advanced that certain of its contributions are ready for practical application. For example, at least 5 of the vitamins, and in some instances their precursors in the human body, have been isolated; their chemical and physiological properties have been demonstrated and suitable chemical and physiological tests have been worked out, whereby the latent state in several deficiency diseases may be recognized. Many of these tests are being used currently in hospital and dispensary practice, where they have opened the way to new fields of knowledge and to more effective therapy. Disturbances of nutrition are associated with practically every disease to which flesh is heir, and these new methods are helping to define the character and importance of this part of the symptom complex.

At the last Annual Conference of the Milbank Memorial Fund, a distinguished group of clinicians, biochemists, pediatricians and physiologists, was called together to report on these tests. We quote from their report¹²:

Diagnostic methods have been elaborated for detecting the early stages of the various specific deficiency diseases which are seen in the population, and these tests are in various stages of development. In general they fall

into two groups: physiological and biochemical. Physiological tests are used in detecting the latent state by applying an exaggerated stimulus or stress, and eliciting those signs which occur naturally in the more severe stages of the disease. The chemical tests are performed on the blood or urine where dietary inadequacies or other etiological factors are reflected by low values. Specific tests have been developed, or are in the process of development, for such nutritional disturbances as deficiency in vitamins A, B₁, C, D, protein and iron. (It should be explained that both types of tests have not been developed for all deficiency diseases; nor where they are available, are they developed to the same degree. In some, the physiological test is at the moment superior; in others the advantage rests with the chemical test.) In the opinion of the group, some of these tests have now been perfected to the point where they are ready for trial application to a much wider extent than has been given them in the past.

USE OF NEW PHYSIOLOGICAL AND BIOCHEMICAL TESTS

This is an extremely conservative statement and rightly so. There is no doubt that several of these methods are ready for immediate practical test on a large scale, but a period of trial application under experimental conditions would seem to be a desirable safeguard against the indiscriminate use of any methods not completely developed, and against piecemeal utilization of any one method as sufficient in itself for assessing nutritional status. Just how many tests are reliable enough for routine use, how many should be used, and how they may be used most effectively, are as yet unanswered questions. For routine application in public health work, where large numbers must be dealt with, and where there are limitations in budget and personnel, the specific questions are: How *few* of these tests will give a reliable indication of nutritional status; and how may these tests be applied to large groups as effectively and economically as possible?

Scattered attempts are being made, largely under the leadership of uni-

versity departments of home economics, to answer these questions. A comprehensive study is being planned on a coöperative basis by the Departments of Preventive Medicine and Pediatrics of Cornell University, the U. S. Public Health Service, the New York City Department of Health, and the Milbank Memorial Fund.

Plans under consideration call for medical as well as dietary histories of a large group of children. In the medical history more than the usual emphasis will be placed on the occurrence of infections, amount of sleep, amount and type of activity, and exposure to sunlight.

The physical examination will include selected measurements and be supplemented by a dental examination. Among the physiological tests will be measurement of visual dark adaptation and the neuromuscular response to galvanic stimuli. Roentgenograms will make possible a study of the skeletal system. Examination of the blood will include a red cell count, determination of the concentration of hemoglobin, an hematocrit reading of the proportion of corpuscles, a total and differential white cell count. Biochemical tests will be used to measure the concentration of ascorbic acid, calcium, phosphorus, and phosphatase in the blood. The thorough clinical examination will be supplemented by stethographic and electrocardiographic recordings of the heart sounds and conduction patterns. Urine examinations for sugar and albumin will be carried out. Finally, there will be a serological test for syphilis and a Mantoux test.

This is an extraordinary number of tests to apply to a population, and we do not believe that it will be practicable widely to generalize such studies. This is essentially an experimental study with the object of selecting those tests and methods which may be recommended for routine use in appraising

nutritional status. The task we have undertaken is difficult and time consuming, and our results will need confirmation by other workers. We wish to emphasize that the ultimate object is to determine the size, the nature, and the distribution of the nutritional problem. Such knowledge is essential if we are to raise the nutritional level of our people. Without accepted methods of ascertaining the individual's state, the nutrition work now being carried on cannot be sharply focused on the malnourished. For lack of such methods the results of the educational work in nutrition, on which much time and money are being spent, cannot be closely evaluated. Finally, the absence of such methods makes it difficult to supplant debate by demonstration on whether, or to what extent, impaired nutrition may play a part as a predisposing factor in parasitic diseases, such as tuberculosis; as well as the part played by satisfactory nutrition in building up resistance against such disease.

THE CHALLENGE TO THE OFFICIAL HEALTH AGENCIES

If the League's committee is correct in its view that the malnutrition existing in all countries is a challenge and an opportunity, that challenge and that opportunity are of the greatest importance to the health agencies, for to them has been entrusted the care of the public health. We have suggested that these agencies have been somewhat handicapped by tradition and have failed to advance as rapidly as increasing knowledge of nutritional science would appear to permit. The opportunity presented by malnutrition has been seized by other social agencies which are attempting to apply for public benefit the newer knowledge of nutritional science. We cannot place obstacles in the path of any agency which is doing good work in this field,

but we can review our own position, adapt our own program to the new knowledge and the new opportunities and join with these other agencies in the attempt to use the new weapons of science in the cause of greater social progress. The U. S. Public Health Service has set a splendid example by its recognition of the importance of nutrition in the public health field. It has helped to advance our knowledge of the science, and carried out critical studies of the means now used to apply that knowledge. Nor has the U. S. Children's Bureau failed to appreciate the importance of the factor of nutrition in infant and maternal welfare.

We believe that the American Public Health Association is in a position to provide at least some of the leadership needed by the public health agencies in their effort to meet the challenge of the widespread existence of malnutrition. It is our earnest hope that the challenge will be met and the opportunity seized as rapidly and adequately as possible.

REFERENCES

1. Final Report of the Mixed Committee of the League of Nations: *The Relation of Nutrition to Health, Agriculture and Economic Policy*. Series of League of Nations Publications, Geneva (A.13, 1937, II.A.), p. 53.
2. Morey, N. B. A Study of the Food Habits and Health of Farm Families in Tompkins County, New York. Cornell University, Agricultural Experiment Station, *Bull.* 563, 1933.
3. Wiehl, Dorothy G. Diets of Low-Income Families Surveyed in 1933. Health and Depression Studies No. 3. *Public Health Rep.*, 51:77-97, 1936.
4. Stiebeling, Hazel K. Report of Round Table on Nutrition and Public Health, *New Health Frontiers*, Milbank Memorial Fund, New York, 1937, p. 62; see also mimeographed bulletin of U. S. Department of Agriculture, Bureau of Home Economics: Diets of Families of Wage Earners and Low-Salaried Clerical Workers Living in Industrial Communities in Three Regions of the United States—1934-36.
5. Roberts, L. J., Blair, R., Lenning, B., and Scott, M. Effect of a Milk Supplement on the Physical Status of Institutional Children. I. Growth in Height and in Weight. *Am. J. Dis. Child.*, 56:287-300, 1938.
6. Roberts, L. J. *Nutrition Work with Children*. Rev. Ed. 639 pp. Chicago: The University of Chicago Press, 1936.

7. Jacobs, E. Is Malnutrition Increasing? *A.J.P.H.*, 23:784-788, 1933.

8. Sydenstricker, Edgar. Health and the Depression. *Milbank Mem. Fund Quart.*, Oct., 1933, p. 278.

9. Gafafer, W. M. Relation of Physical Defects to Nutritional Impairment, Based on the Examination of 30,000 Children of 21 States. Physical Measurement Studies No. 5. *Am. J. Med. Sci.*, 192:669-673, 1936.

10. Final Report of the Mixed Committee of the League of Nations. *The Relation of Nutrition to Health, Agriculture and Economic Policy*. Series of League of Nations Publications, Geneva (A.13, 1937, II.A.), p. 302.

11. Palmer, C. E. Height and Weight of Children of the Depression Poor. Health and Depression Studies No. 2. *Pub. Health Rep.*, 50: 1107-1113, 1935.

12. *Modern Health Trends*. Milbank Memorial Fund, New York, 1938, p. 77.

Knowledge and Wisdom

"Man has grown exceedingly powerful. . . . He has gained in knowledge and skill at a rate which in modern times can be likened only to the ascent of a skyrocket. . . .

Thus we have grown marvellously powerful and clever in our means for achieving our purposes. But in the wisdom of our choice of purposes to be achieved we have at best marked time; when, with the advancement of our powers for good and ill, the problem of adjusting our standards of value to the new conditions has become superlatively urgent.

We may well ask: Has an immature

human race stumbled upon a dangerous toy? Are we children playing with a loaded gun? Shall we grow up in wisdom before tragedy engulfs us? Is this the riddle of the Sphinx, to fail in which means destruction? Or may we perhaps look forward to an era of an awakening in wisdom, commensurate with the rocket-like ascent in knowledge? Should this come about, then Utopia, from an idle dream, would become a real presence." — Alfred J. Lotka, *Contact Points of Population Study with Related Branches of Science*. *Proc. Am. Philosophical Society*, Feb. 15, 1939, p. 624.

A Comparison of Indices Used in Judging the Physical Fitness of School Children^{*†}

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WITH the public conscience demanding protection of the health of the child and the school medical services expanding to meet this need, the development of a simple, economical, but accurate means of assessing the child's state of well-being or physical fitness is in order. During recent years many workers in the field of child health and growth have recommended different indices of body build as a step in the solution to this problem. Clinicians have recognized that the use of such an index is only one of the tools at their command for evaluating the individual child's state of well-being, and that the child's past history, his individual growth pattern, the evidences of nutritional deficiencies, such as rickets or anemia, as well as of organic disease, are also of significance. But such a highly refined examination, including laboratory procedures, is not

practical in the ordinary school health program, so that there is a need to determine which of the various methods of assessment may be both easy to apply and productive of results.

To help clarify this situation the U. S. Children's Bureau, the Institute of Human Relations, and the Department of Pediatrics of the Yale University School of Medicine undertook a study of 713 seven year old white boys ‡ and girls living in New Haven, Conn., during 1934-1936.** The primary objective of this investigation was to study and compare various procedures used in evaluating the child's health. A full and detailed report is in preparation at the present time. This paper is concerned only with a limited aspect of the whole problem; namely, the ability of each of four indices of body build to identify children who are likely to be physically unfit, using as criteria of reference (1) the findings of the physician with respect to the child's general nutritional condition, and (2) the child's annual rate of gain in weight.

* Read at a Joint Session of the Child Hygiene and Food and Nutrition Sections of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 25, 1938.

† From the Children's Bureau, U. S. Department of Labor, with the coöperation of the Institute of Human Relations of Yale University, and the Department of Pediatrics of the Yale University School of Medicine. Grateful acknowledgment is made to Frank K. Shuttleworth, Ph.D., for assistance in planning and directing the study.

‡ Age is defined in completed years last birthday.

** The children were first examined when they were 6 years old, but the analyses are based on the observations made when these boys and girls were 7 years of age.

This study has one particular advantage: All the indices have been applied to the same group of children, and probably for the first time there are available direct comparisons of the ability of the several indices to identify boys and girls who may be in need of medical attention or nutritional assistance. The indices studied include, first, the Baldwin-Wood height-weight index; second, the Pryor width-weight index, which is an elaboration of the Baldwin-Wood standard; third, the Nutritional Status Indices developed by Franzen and his coworkers in the American Child Health Association; and fourth, the ACH (arm-chest-hip) index, which was also developed by that group.

The assumptions inherent in the development of such indices of body build and the applicability of the statistical methods used in deriving the indices and identifying children who may be in a poor physical condition deserve careful consideration. It is also important to know the kind and number of children whose measurements were used in forming the indices. All these problems are important, but the school health officer is primarily interested in knowing whether an index works; that is, whether it is able to pick out children who may be physically unfit. The New Haven study attempts to answer this question in respect to 7 year old children.

In applying and testing these four indices, the prescribed procedures as laid down in the original reports have been followed. According to the Baldwin-Wood index a child less than 10 years of age is underweight if his actual weight is 6 or more per cent less than his expected weight. The Nutritional Status Indices of Franzen make it possible to determine a child's standing, relative to his skeletal peers, in each of three "traits"—arm girth, weight, and subcutaneous tissue. As

Franzen has not indicated the percentage of children who are likely to be physically unfit, each index has been set to identify, for the purpose of this study, the lowest 15 per cent of the boys and girls.* The children thus selected have been defined arbitrarily as the group most likely to be in need of medical care or nutritional assistance. A similar procedure for identifying the lowest 15 per cent of the children has also been employed in the New Haven Study for testing the Pryor width-weight index,† while the ACH index has been set to pick out the lowest 14 per cent of the group of boys or girls included in the study.

All white children who were of single, legitimate birth, who were between 6 and 7 years of age when the first physical examination was made, and who were attending the public or parochial schools of New Haven, Conn., were eligible for inclusion. A single pediatrician made two annual physical examinations of each child. At the same time a single technician trained in anthropometry took the necessary anthropometric measurements according to the prescribed technics. The child's medical history and his socio-economic status were ascertained, and he was weighed at quarterly intervals during the 19-20 month period of observation. Except for hemoglobin and red blood cell tests of 133 of these children, no attempts were made to refine the clinical examinations with laboratory tests of the child's physiological state.

A single case history may serve to illustrate the different kinds of observations which were made on each child.

J. K. was a little Polish girl who lived with her mother and an older brother and sister

* Table X, *Nutritional Status Indices*, p. 65. American Child Health Association. New York, 1935.

† The method has not been outlined in any of Dr. Pryor's papers, but she has approved this procedure, which corresponds approximately to the method used in testing the Nutritional Status Indices.

in the central part of New Haven. The family income was very low both years of the study—only about \$545 when J. K. was 7 years old. The child's diet was necessarily poor in amount and quality. Vegetables, fresh fruit, and meat were served about twice a week, eggs even less frequently. On the other hand, J. K. usually had two to three cups of milk a day. She regularly attended the infant and child health conference in New Haven until she was 2 years old. Her medical history was negative except for whooping cough at 3 years of age.

This little girl was relatively small for her age. At 7 years she weighed about 7 pounds less than the average girl included in the study, was 1 to 2 inches shorter, and more than 1 centimeter narrower at the hips (bitrochanteric width). Her weight gain between the two physical examinations was very unsatisfactory. Between 6 and 7 years of age she gained less than half as much as the average girl included in the study.

According to the physician's judgment she was poorly nourished at the time of both annual physical examinations. The most important clinical findings included the following items: The amount and condition of the child's subcutaneous fat and musculature were recorded as poor at both 6 and 7 years of age; the two 6 year molars which erupted in the interval between the physical examinations as well as the two which had erupted earlier were all carious when the second examination was made. There was also a moderate deficiency in hemoglobin (84 per cent),* and a somewhat lowered red-blood count (4,240,000).

The child had several illnesses during the period of observation. She had measles 4 months after the first examination was made, and just before the second examination she suffered from an acute upper respiratory tract infection and a rather severe gastrointestinal upset.

The question before us is then: Do the indices indicate that this child was in a poor physical condition at 7 years of age? She was identified as under par by the Baldwin-Wood index. According to this index she was found to be about 7 per cent underweight, but the Pryor width-weight index and the ACH index failed to identify her as below

par. The Nutritional Status Indices of Franzen indicated that both her subcutaneous tissue and weight were within normal limits but that her arm girth was much smaller than would have been expected (86 per cent of the girls with the same body build would have had a larger arm girth). Of course, these results should be interpreted cautiously in so far as the child's well-being is concerned, for it should be remembered that none of the indices or tables attempts to evaluate physical fitness as such but only in so far as it is related to such measures as the child's weight, arm girth, subcutaneous tissue, or the difference between arm girth and chest depth estimated in terms of body build as defined by each index. It should also be pointed out that these findings are of interest only in reflecting the ability of the indices to evaluate this particular child's physical condition.

The more important question whether the indices identify the majority of the children who are physically unfit can be answered only by comparing each of the four indices with other criteria of physical fitness. For example, the boys and girls whom the physician judged to be poorly or very poorly nourished at 7 years of age were compared with the children who were identified by an index as likely to be in a poor physical condition. Similarly, the boys and girls who exhibited an unsatisfactory percentage weight gain between 6 and 7 years of age were compared with the children who were selected by each index. Other and even more restricted criteria, involving both clinical judgment and estimates of gain in weight or increase in arm girth, also were applied.

In this preliminary report it is possible to present only two comparisons. The first concerns the agreement between the physician's clinical judgment and each of the indices. The physician

* The Haden-Hauser hemoglobinometer was used for estimating hemoglobin. These determinations were made 17 weeks following the second physical examination.

who examined these children classified 40 of the 348 girls as poorly nourished at 7 years of age. The Baldwin-Wood index identified 25 girls, or 63 per cent of these 40 children, as underweight. When the Pryor width-weight index was applied only 28 per cent of the 40 girls were picked out as underweight, and with the ACH index the percentage identified as below par was apparently somewhat less (10 per cent). The results of testing the Nutritional Status Indices of Franzen appear to be even more discouraging. The weight index identified only 3 per cent, and the indices for arm girth and subcutaneous tissue picked out 5 per cent of the 40 girls whom the physician judged to be poorly nourished at 7 years of age. Although these percentages are based on a very small number of children, it should be remembered that according to one physician's judgment these 40 girls represent the more extreme cases of poor nutrition. Although her clinical judgment is liable to a certain amount of error, is it not reasonable to expect that even for such a small number of children there would have been better agreement between the clinical judgment of the child's general nutritional status and any one of the indices if the physician and the index were each attempting to measure the same phenomenon?

The second comparison is between annual percentage gain in weight—a more objective criterion than clinical judgment—and each of the indices applied when the children were 7 years of age. Assuming that the children who exhibited an unsatisfactory percentage gain in weight (those in the lowest 10 per cent of the group) were likely to be in a poor physical condition, the results, so far as showing the usefulness of any of the four indices, are even more discouraging. The percentage of such children identified by any one of the indices is very low. The

Baldwin-Wood index showed the maximum agreement, only 29 per cent, while the Nutritional Status Index for weight failed to identify any of the 35 girls whose weight gain was considered very unsatisfactory. Here again the results should be interpreted cautiously, for the percentages are based on only 35 children. It should be remembered, however, that their weight gain was exceeded by 90 per cent of the girls who were included in the study.

These findings pertain only to the girls.* Similar analyses indicate that the indices also failed to identify a large number of the boys whom the physician judged to be poorly nourished or whose weight gain was markedly below average.†

Of course neither of these two criteria—clinical judgment and the child's percentage gain in weight—is an entirely satisfactory method for assessing the total physical well-being of the child. This does not mean, however, that they cannot be used to furnish evidence for judging the validity of the indices. On the contrary, one may expect that a large proportion of the children who are selected by these criteria should also be identified by the indices.

* The evidence presented in this paper may be substantiated by ascertaining the percentage of the 348 girls who must be identified by each index (except the ACH index which does not permit of such an analysis) in order to include the 40 girls whom the physician found to be poorly or very poorly nourished. These percentages are as follows: For the Baldwin-Wood index, 79.5 per cent; the Pryor index, 81.8 per cent; the Nutritional Status Index for weight, 89.0 per cent, for arm girth, 84.1 per cent, and for subcutaneous tissue, 93.1 per cent.

The percentages for including the 35 girls whose weight gain was unsatisfactory are 98.6 for the Baldwin-Wood index; 97.7 for the Pryor width-weight index; 98.6 per cent, 100 per cent, and 97.7 per cent, respectively, for the Franzen weight, arm girth, and subcutaneous tissue indices. Thus it is necessary to set the Pryor index to identify 97.7 per cent of the 348 girls in order to include the 35 girls who showed an unsatisfactory weight gain.

† If the ACH, Pryor, and Nutritional Status Indices are set to identify the lowest 20 per cent instead of the lowest 15 per cent of the children, the agreement between the indices and each of the two criteria, clinical judgment and gain in weight, is also unsatisfactory.

If such indices do not furnish the school health officer with a satisfactory method of identifying a child who may be in need of medical attention or nutritional assistance, what procedures should he use? At the present time the clinical examination must certainly form an integral part of the assessment, especially if determining the need of medical care is to be one of the objectives of a school health program. On the other hand, a great deal can be done to improve the clinical examination and to make the physician's judgment more stable and objective. Provision must also be made for observing the child at regular intervals so that his physical condition can be evaluated in terms of his own previous growth and health. Until the physician is furnished with more satisfactory and practical tools for evaluating the child's physical fitness, it may also be wise to

supplement the clinical examination with some simple measure of the child's progress, such as his relative gain in weight. Observations made on the 713 children included in this study are being used to investigate this problem.

SUMMARY

Four indices—the Baldwin-Wood index, the ACH and Nutritional Status Indices of Franzen, and the Pryor Width-Weight index were applied to 713 seven year old boys and girls, who were observed for a period of 19 to 20 months in New Haven, Conn., during 1934-1936. The indices failed to identify many New Haven children whom the physician found to be poorly nourished or who exhibited a very unsatisfactory percentage gain in weight. A more comprehensive and detailed report of this study is in the process of preparation.

A STUDENT has unusual opportunities to court instruction during a visit with the college physician, whether the purpose of his call be for diagnosis or treatment of a specific ailment or for medical advice on some general problem, or because of some difficulty with the administration or some emotional value. In the doctor's office or infirmary the student is exposed to other situations which have distinct educational value. He should learn the methods of a well equipped

physician working in a "model" office. He should learn something of the doctor's problems of diagnosis and therapy, he should learn what to expect of medical procedures and the value to him of seeking early medical attention. He should learn something about the use and abuse of drugs, and should learn to interpret medical articles and advertisements. He should learn how to discriminate between sound and unsound medical practice.—C. E. Shepard, *Journal-Lancet*, Feb., 1939, p. 70.

Sanitary Condition of Paper Containers for Retail Packaging of Perishable Foods*

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A STUDY has been made during the past two years of paper wrappers and containers for perishable foods. The work has included bacteriological studies of seven types of paper containers for milk and milk products, and a study of the sanitary condition of the paperboard out of which the containers are made.

IMPORTANCE OF CLEAN, SANITARY PAPERBOARD

As shown in Table I, paperboard made from mixed waste papers may yield bacterial counts of 1,000 to 40,000 colonies per gram. It is generally agreed that paper stock that has previously been used for commercial purposes should not be employed as packaging materials for perishable foods. High bacterial counts and the presence of miscellaneous foreign matter, dirt, ink, and waste in this secondary stock render it decidedly unsuitable for contact with foods. Food wrappers and containers should be made of virgin stock which may be processed and fabricated so as to yield

paper products that are essentially sterile.

In contrast to the class of materials containing secondary stock, this table also presents bacterial counts obtained from paperboard used for milk and other food containers. These were made entirely from virgin stock. The latter counts usually vary from essential sterility to 500 colonies per gm. Bacterial counts of paperboard consisting of virgin pulp have during the past year been steadily decreasing. The percentage of paperboard samples approaching essential sterility is on the increase.

The bacteriological results are obtained by reconvertng samples of paperboard under aseptic conditions, to pulp suspensions and analyzing the disintegrated paper. The device employed for this purpose previously described in detail¹ consists of a motor of the type used for food mixers, equipped with two fan-type beaters.† Bacteriological findings thus far indicate that paperboard having low bacterial counts yields containers which are nearly or actually sterile. While rinse tests may not reveal differences in

* Approved by the Director of the New York State Agricultural Experiment Station for publication as Journal Paper No. 301, December 10, 1938. Read before the Food and Nutrition Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

† Arrangements are being made with the usual laboratory supply houses such as Fischer Scientific Materials Company, Pittsburgh, Pa., and the Will Corporation, Rochester, N. Y., to list this adapted equipment in complete form. Cost about \$20.

TABLE I

Bacterial Counts per Gram of Disintegrated Paperboard Obtained Between July, 1937, and October, 1938

Grades of Paper	Percent- age		Percentage Yielding Counts Between						
	Total	Showing							
	Number	No	51-100	101-250	251-500	501-1,000	1,001-10,000	10,001-40,000	
<i>Paperboard of Virgin Stock</i>									
Milk container board	824	5	30	26	21	10	8	0	0
Ice cream and butter boxes; cup, plate, cap stock	77	4	47	35	7	5	2	0	0
Paper straws	25	44	56	0	0	0	0	0	0
<i>Paperboard containing Secondary Stock</i>									
Fiber cans, breakfast food cartons, etc.	52	0	0	0	0	10	8	48	34

counts where a large majority of the containers give less than 5 colonies per container, the rinsing and incubation of containers with sterile broth is a useful method of determining the presence or absence of demonstrable organisms. This testing may be performed by introducing 10 cc. of sterile nutrient broth into each container, followed by shaking in the usual manner, but incubating the medium in the container. After incubation, containers are examined for the presence or absence of growth. Table II shows certain relationships of board counts and waxing

efficiency to container contamination.

The results of this investigation indicate that cleanliness and freedom from bacteria in paper containers for milk and milk products depend upon the use of a foundation board that is clean and free from bacteria, also the maintenance of this condition through proper methods of handling and storage. Efficient paraffining of high quality paperboard tends to suppress or "seal in" the few cells remaining in high class paper stock. Testing finished containers with sterile nutrient broth aids in revealing the effects of high

TABLE II

Correlations Between Bacterial Counts of Paperboard and Contamination of Finished Containers

Container Type	Source of Paperboard	Paperboard Counts Colonies per Gram	Number Containers in Series	Finished Containers		
				Percentage Sterile in Broth	Rinse Counts. Percentage Yielding Less than 5 Colonies per Container	Moisture Proofing
1	Mill A	Less than 100	1,003	77	96	Good
1	Mill I	Less than 250	2,335	14	93	Variable
2	Mill B	Less than 100	210	68	83	Good
2	Mill K	Less than 500	617	16	66	Variable
3	Mill G	Less than 500	695	16	73	Variable
4	Mill B	Less than 100	180	67	83	Variable

TABLE III

Influence of Temperatures of Paraffining on Bacteriological Tests of Finished Containers

Paraffining Temperatures	Number Containers in Series	Board Counts Colonies per Gram	Finished Containers		
			Rinse Counts		
			Percentage Sterile in Broth	Percentage Showing No Growth	Percentage Yield- ing Less than 5 Colonies
165° F.	730	Less than 250	82	66	96
180° F.	1,370	Less than 250	18	62	95

quality paperboard and efficient paraffining on the percentage sterility of the containers.

Over 90 per cent of the organisms isolated from container rinses were spore-formers and micrococci. The remaining types consisted of sarcinae, actinomyces, and filamentous fungi. This flora, which is typically heat-resistant and dryness-resistant, is characteristic of the organisms found in paperboard.

INFLUENCE OF EFFICIENT MOISTURE-PROOFING

The effectiveness of paraffin coating has a marked influence upon the results of bacteriological tests on fabricated containers. Where methods of paraffining produce continuous coatings of wax over paperboard surfaces with

effective sealing of corners, edges, and interstices, bacteriological findings show appreciable improvements over containers subjected to mediocre paraffining.

Table III indicates the significance of temperature, which is one of the factors influencing paraffining efficiency.

Generally speaking, more satisfactory coatings of wax were obtained at 165° to 170° F. than at temperatures of 180 to 185° F. Other factors, such as the physical properties of the sheet (porosity, smoothness of surface, formation, etc.) method of paraffining and draining, temperature of container before and after paraffining, and characteristics of paraffin used, also affect moisture-proofing efficiency. With the use of higher paraffining temperatures and slow cooling, while better penetra-

TABLE IV

Comparison of Results Secured with Four Different Rinse Methods Using Standard Nutrient Agar with Incubation at 37° C. for 48 Hours

Methods	Percentage		Total Number Containers Examined
	Showing No Growth	Yielding Less than 5 Colonies per Container	
Rinse 10 ml.			
8 ml. in 3 regular plates	48	92	1,561
8 ml. in 1 large plate	63	96	1,120
Rinse 20 ml.			
10 ml. in 3 regular plates	60	91	860
10 ml. in 1 large plate	64	94	770
			4,311

tion is usually secured than at lower temperatures, there is a tendency for excessive run-off of paraffin from side seams and from parts of containers having extra thicknesses of paperboard, leaving exposed uncoated areas which are capable of absorbing milk and other liquids. The primary purpose of moisture-proofing treatments of essentially sterile paperboard is to render the product non-absorbent. Paperboard specifications and paraffining procedures should be established which will result in efficient moisture proofing.

BACTERIOLOGICAL EXAMINATION OF PAPER MILK CONTAINERS' BY RINSE METHODS

Various rinsing and plating methods are under investigation. Table IV presents the results of plate counts obtained by rinsing one type of container with sterile water. This was a coöperative experiment in which 5 different laboratories, using the same methods and technic, participated.

Counts between 6 and 100 organisms per container are sometimes obtained and a few scattering ones that are over 100. The results presented in Table V show rinse counts obtained on 7 types of paper containers for milk, tested during 1937 and 1938.

During the present year marked improvements have taken place in the bacteriological condition of both paperboard and finished containers over the results obtained a year ago. Effective programs of cleanliness and microbiological control at pulp and paper mills and container factories are directly responsible for improved sanitary quality in containers for perishable foods. It is possible that the goal that the industry has set, namely, uniform sterility of paper products where these are used as containers and wrappers for perishable foods may eventually be achieved. In addition to paper containers, bottle caps, gaskets, and similar articles for milk and milk products, containers for ice cream, cheese, butter;

TABLE V
Rinse Counts Obtained from Various Types of Containers

Container Type	Rinse Counts per Container During 1937							Rinse Counts per Container During 1938						
	Total Number Examined	Percentage Showing No Growth	0-5	6-100	101-250	251-500	500+	Percentage Showing No Growth	0-5	6-100	101-250	251-500	500+	
1	4,787	43	88	10	1.5	0.14	0.36	57	93	6	0.93	0	0.07	
2	1,523	9	85	10	1	0.7	0.3	31	76	20	2.0	0.4	1.6	
3	1,299	0.5	13	80	3	1.4	2.6	22	70	27	0.7	0.3	2.0	
4	180	..	..	..	..	..	..	34	83	15	0.3	0	1.7
5	70	..	..	..	..	..	..	37	87	12	1	0	0
6	120	18	71	27	2	0	0	..	..	..	..	..	..
7	74	12	60	36	4	0	0	..	..	..	..	..	..

These figures reveal only small differences among the rinse procedures used. As previously stated, however, where containers have so few microorganisms, it is helpful to supplement plating methods with a sterility test in which 10 cc. of sterile nutrient broth is added to each container.

and frozen foods; wrappers for bread, meat, butter, fruits and vegetables; also paper straws and trays are included in this investigation.

REFERENCE

1. Sanborn, J. R. Disintegration of Paper Board for Bacteriological Examination. *A.J.P.H.*, 28:576-578 (May), 1938.

Specific and Nonspecific Serum Treatment of Scarlet Fever*

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THE serum treatment of moderately severe scarlet fever is common practice in communicable disease hospitals, and either convalescent serum or antitoxin is generally given by the intramuscular route. The usual dose for the former is 30 cc., and for the latter, one therapeutic dose (6-10 cc.). In some fever hospitals all patients with scarlet fever are treated with serum, and as a rule this is antitoxin. In others serum is administered intravenously whether it be convalescent serum or antitoxin, and although the therapeutic effect is somewhat better and more dramatic, still there is a hazard in such use. At the Herman Kiefer Hospital both sera are used. Prior to 1930 treatment was largely restricted to use of antitoxin, but since that time convalescent serum when available has largely displaced antitoxin because sensitivity to horse serum is thus avoided. There are proponents of both convalescent serum and antitoxin, but the literature reveals no studies carried out on large numbers of patients where both sera were used

during the same epidemic on alternate patients. Such a study was begun August 1, 1936, and carried on for one year. The fiscal year was divided for study purposes into 2 periods of 6 months each, the reason for which will become apparent later.

During the first 6 months, convalescent serum and antitoxin were given to alternate patients who on admission appeared to have exhibited scarlet fever of a moderately severe grade. The determination of the severity of the case and the necessity for serum was the responsibility of two resident physicians (chief and senior) who have been on the Communicable Disease Service for over 10 years. They had no part in the choice of serum to be used. Whenever the serum sensitivity test was positive when antitoxin was to be administered, convalescent serum was given instead, and the case was excluded from the series. The next patient needing serum was given antitoxin if the sensitivity test was negative. Serum was administered in the admitting room prior to removal of the patient to the scarlet fever pavilion.

The scarlet fever convalescent serum used was obtained from recently recovered donors bled in the Department

* Read at a Joint Session of the Health Officers, Laboratory, and Epidemiology Sections of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938. (This study was aided by WPA Project No. 82-4-120).

of Health Serum Clinic, and each batch of serum represented the contribution of about 10 donors. Thirty-three samples of serum from as many batches were tested for antitoxin content by the Veldee rabbit ear method, and no batch contained more than 2 units per cc. The dose was 30 cc., and a patient received no more than 60 units of antitoxin when convalescent serum was administered. The scarlet fever antitoxin used was obtained from the Laboratories of the Michigan State Department of Health, and each therapeutic dose (10 cc.) contained a minimum of 6,000 units. The ratio, then, of antitoxin in scarlet fever antitoxin to that in scarlet fever convalescent serum was roughly of the order of 100:1.

The data obtained during the 6 month period were the result of treating alternate cases of moderately severe scarlet fever with convalescent serum and antitoxin. The method of serum assignment was expected to result in comparable groups. To try this assumption, the serum groups were tested with respect to the following important characteristics: distribution of cases by month, by age, by temperature on admission to hospital, by day of disease treatment was begun, and finally by the proportion of cases with significant associated conditions. The two serum groups did not differ with respect to the characteristics considered, and for our purpose may be looked upon as comparable in all respects except kind of serum administered.

RESULTS OF TREATMENT FOR THE
6 MONTH PERIOD, AUGUST 1, 1936,
THROUGH JANUARY 31, 1937

During the first 6 months of the study 346 patients with moderately severe scarlet fever were admitted to the Communicable Disease Service. A few patients who belied their real condition upon admission to hospital were

originally in the series but obviously did not belong there because they were of the toxic or septic type necessitating different treatment. The elimination of such cases accounts for the slight discrepancy in the serum group totals. One dose of convalescent serum was given intramuscularly to 177 patients while 169 received one dose of scarlet fever antitoxin by the same route.

Augmented Treatment—Whenever a patient showed no improvement in clinical condition, or the admission temperature had been maintained or risen during a 24 hour period following serum treatment, an additional dose of serum was administered. When this was found necessary, it was charged as a failure against the serum originally administered. Cases with such augmented treatment were excluded from the study in order that the value of one dose of either serum might be determined. In Table I the number of cases in which augmented treatment was necessary is shown for both convalescent serum and antitoxin. Additional serum was administered in 14 cases in which convalescent serum was initially used, compared to 11 patients among the group given antitoxin. One case subtracted from the convalescent group and added to the antitoxin group would change the proportion but slightly, and when tested statistically no significant difference is demonstrated.

TABLE I
Serum Treatment of Scarlet Fever
Number and Proportion of Cases with
Augmented Treatment by Type
of Serum Used

Serum	Total Cases	Augmented Treatment	Per cent Aug. Treatment
Convalescent	177	14	7.9
Antitoxin	169	11	6.5

Temperature Pattern—Cases were classified into 3 groups in relation to the effect of serum on temperature. The first group includes cases in which

the temperature declined to normal or to within 1 degree of normal within 24 hours of serum administration, the temperature remaining normal thereafter for a minimum of 5 days. The second group contains cases in which temperatures declined by lysis within 5 days, a reaction considered average for moderate cases of scarlet fever treated without serum. The third group consisted of patients whose fever continued for a period longer than 5 days. When the two sera are compared on the basis of this classification, no noteworthy difference is demonstrated (Table II).

TABLE II

Serum Treatment of Scarlet Fever

Temperature Pattern of Cases by Type of Serum Used

Temperature Pattern	Number of Cases		Per cent of Total Cases	
	C	A	C	A
Normal	88	88	54.0	55.7
Lysis (5 days)	46	40	28.2	25.3
Con't fever	29	30	17.8	19.0
Totals	163	158	100.0	100.0

Uncomplicated Cases—Scarlet fever is a disease in which complications are quite prevalent, and in general it may be stated that slightly over one-half of the hospital cases of a moderately severe grade will develop complications

of one sort or another. In Table III, the number and proportion of uncomplicated cases are shown by type of serum used. A comparison of the two sera with respect to this factor shows little difference.

TABLE III

Serum Treatment of Scarlet Fever

Uncomplicated Cases by Type of Serum Used

Serum	Total Cases	Uncomplicated Cases	Per cent Uncomplicated
Convalescent	163	70	43.0
Antitoxin	158	68	43.7

Occurrence of Complications—Certain complications occur with greater frequency in scarlet fever than others. The commonest in hospital practice are rhinitis, cervical adenitis, and suppurative otitis media, in the order named. In Table IV the complications noted during the first 6 month period are listed with respect to frequency, proportion, and the type of serum used. Rhinitis and cervical adenitis occurred with the same frequency. The incidence of suppurative otitis media as well as the remainder of the complications shown in the table occurred too infrequently to warrant analysis.

Proportion of Cases with Multiple Complications—The complication analysis was carried one step further by determining the number of complica-

TABLE IV

Serum Treatment of Scarlet Fever

Occurrence of Complications by Type of Serum Used

Complications	Convalescent		Antitoxin	
	No.	Per cent	No.	Per cent
Otitis media, cat.	5	3.1	9	5.7
Otitis media, supp.	9	5.5	11	7.0
Mastoiditis	2	1.2	3	1.9
Ethmoiditis	2	1.2	2	1.3
Rhinitis	65	39.9	63	39.9
Angina, post-scarlatinal	5	3.1	..	...
Cerv. adenitis, non-supp.	38	23.3	37	23.4
Arthritis	5	3.1	4	2.5
Carditis	1	0.6	2	1.3
Abscess, soft parts	4	2.5	4	2.5
Paronychia	5	3.1	5	3.2
Bronchopneumonia	1	0.6	..	...
Total cases treated	163		158	

TABLE V
Serum Treatment of Scarlet Fever
Number of Complications per Case by Kind of Serum Used

Kind of Serum		Number of Complications per Case					Complications Group			Entire Group	
		1	2	3	4	5	No. of Cases	No. Compl.	Compl. per Case	No. of Cases	Compl. per Case
C	No.	54	29	10			93	142	1.5	163	0.87
	Per cent	58.1	31.2	10.7							
A	No.	50	33	5	1	1	90	140	1.6	158	0.88
	Per cent	55.5	36.7	5.5	1.1	1.1					

tions an individual contracted with relation to the type of serum used. Here again, the differences are not striking (Table V). The frequency and proportion of cases in which one, two, or three complications occurred are practically the same. When only complicated cases are considered, each case has less than two complications, whereas the inclusion of all cases in each serum group shows less than one complication per case.

late release, if the therapeutic effect of serum lasts for an average period of 2 weeks. In Table VI the dismissal status of cases admitted to hospital during the first 6 months is shown by age, number, and proportion of late dismissals, and by type of serum used. An analysis of the table shows that in the antitoxin group a larger proportion of patients aged 1 to 4 and 5 to 9 were detained than in the convalescent serum group. The two age groups in

TABLE VI
Serum Treatment of Scarlet Fever
Dismissal Status of Cases Admitted to Hospital

Age	Total in Group		Late Dismissals		Proportion of Late Dismissals	
	C	A	C	A	C	A
Under 1 yr.	..	..	..	..	....	....
1-4 "	31	32	14	19	45.2	59.4
5-9 "	87	75	23	27	26.4	36.0
10-14 "	16	23	4	3	25.0	13.0
15-19 "	6	11	..	3	....	27.3
20+	20	17	2	4	10.0	23.5
Totals	160	158	43	56	26.9	35.4

Dismissal Status—Besides the serious complications which might hinder the dismissal of a patient at the end of 14 or 21 days of isolation, such minor conditions as excoriations about the nose and mouth, paronychia, positive cultures from nose, throat, or ear from pre-admission institutional cases were also included as causes for late dismissal. Both convalescent serum and antitoxin in the dosages given could not reasonably be expected to exert much influence on such causes for

question contain the largest number of cases. In the 10 to 14 age group, which is smaller, the reverse is true. The difference would appear to be considerable, but upon testing the data statistically, no significant difference is noted ($p = .38$).

COMMENT

When the therapeutic results of the first 6 months of the study are compared, there appears to be no significant difference between convalescent

serum and antitoxin in the treatment of moderately severe scarlet fever. This type of scarlet fever is one for which serum therapy has always been used at Herman Kiefer Hospital. A control group not treated with serum was not included in the series for this reason. Therefore, from this study, one cannot determine whether without serum there might have been equally good results. Furthermore, the possibility of a nonspecific serum effect was not ascertained. In order to answer these questions a third serum was introduced, on February 1, 1937, and this was used until the experiment terminated on July 31, 1937. The new serum was nonspecific for scarlet fever and contained 1,000 units of diphtheria antitoxin per therapeutic dose of 10 cc. This was furnished by the Laboratories of the State Department of Health and was from horses which had not been used previously in the production of antistreptococcic sera. The nature of the serum was unknown to the hospital medical personnel until after the termination of the study, so that in so far as is humanly possible, no bias was introduced. The 3 sera were given alternately to moderately severe scarlet fever patients as they were admitted to the Communicable Disease Service. Needless to say, the antitoxin and the convalescent serum used during this period were not measurably different from those used during the first 6 months. In the analysis which follows, "special" serum refers to the newly introduced nonspecific serum. When specific serum is mentioned, convalescent serum, antitoxin, or both, are meant.

The data collected during the second 6 months were put to test with respect to comparability of serum groups in a manner similar to that accorded the data of the first 6 months. The 3 serum groups were found to be comparable with respect to the charac-

teristics tested except kind of serum administered.

RESULTS OF TREATMENT FOR THE 6 MONTHS, FEBRUARY 1, 1937, TO AUGUST 1, 1937

During the last 6 months of the study, 773 patients with a moderately severe type of scarlet fever were dismissed from the Communicable Disease Service. The number of cases was distributed among the 3 serum groups as follows: special serum, 252; convalescent serum, 261; antitoxin, 260. The slight discrepancy in group totals is due, as before, to elimination from each group of toxic and septic cases inadvertently classified as moderately severe on admission.

Augmented Treatment—The number of cases in each group needing additional serum following administration of the initial dose was determined (Table VII). Only 12 and 13 cases receiving convalescent serum and antitoxin respectively needed additional serum; the proportion of such cases is the same. In contrast, the special serum group shows augmented treatment administered to 74, a proportion of 29.4 per cent. When this proportion is compared with that for both convalescent serum and antitoxin, the ratio is nearly 6 to 1. Thus a marked difference is noted in the number of failures as between nonspecific and specific serum therapy. As for the earlier period, failures were eliminated from each group for the remainder of the analysis.

TABLE VII
Serum Treatment of Scarlet Fever

*Number and Proportion of Cases with
Augmented Treatment by Type
of Serum Used*

Serum	Total Cases	Augmented Treatment	Per cent Aug. Treatment
Special	252	74	29.4
Convalescent	261	12	4.6
Antitoxin	260	13	5.0

TABLE VIII

*Serum Treatment of Scarlet Fever**Temperature Pattern of Cases by Type of Serum Used*

<i>Temperature Pattern</i>	<i>Number of Cases</i>			<i>Per cent of Total Cases</i>		
	<i>S</i>	<i>C</i>	<i>A</i>	<i>S</i>	<i>C</i>	<i>A</i>
Normal	79	171	160	44.4	68.7	64.8
Lysis (5 days)	69	46	52	38.8	18.5	21.1
Continued fever	30	32	35	16.9	12.8	14.2
Totals	178	249	247	100.1	100.0	100.1

Temperature Pattern—This factor shows but little variation when the result of specific treatment is compared (Table VIII). There is, however, a striking decrease in the proportion of cases in which the temperature reached normal within 24 hours in the special serum group. The proportion of cases in which the temperature declined by lysis is higher than noted in the specific groups. The proportion of cases with continued fever was slightly greater in the nonspecific serum group.

Uncomplicated Cases—The number of uncomplicated cases in the group receiving special antitoxin was 66 (Table IX). There were 119 uncomplicated cases in each of the convalescent serum and antitoxin groups. The proportions for the various groups were respectively 37.1, 47.8, and 48.2.

It is readily apparent that no difference appears in the proportion of uncomplicated cases in the convalescent and antitoxin groups. The special group again suffers by comparison, and the difference is almost significant ($p = .03$).

TABLE IX

*Serum Treatment of Scarlet Fever**Uncomplicated Cases by Type of Serum Used*

<i>Serum</i>	<i>Total Cases</i>	<i>Uncomplicated Cases</i>	<i>Per cent Uncomplicated</i>
Special	178	66	37.1
Convalescent	249	119	47.8
Antitoxin	247	119	48.2

Occurrence of Complications—The complications are listed in Table X. When the incidence of the 3 common complications of scarlet fever is compared with respect to the three sera tested, one notes as striking a similarity

TABLE X

*Serum Treatment of Scarlet Fever**Occurrence of Complications by Type of Serum Used*

<i>Complications</i>	<i>Special</i>		<i>Convalescent</i>		<i>Antitoxin</i>	
	<i>No.</i>	<i>Per cent</i>	<i>No.</i>	<i>Per cent</i>	<i>No.</i>	<i>Per cent</i>
Otitis media, cat.	6	3.4	10	4.0	11	4.5
Otitis media, supp.	20	11.2	13	5.2	15	6.1
Mastoiditis	4	2.2	..	...	3	1.2
Ethmoiditis	..	...	1	0.4	..	...
Rhinitis	88	49.4	95	38.2	86	34.8
Angina, post-scarlatinal	1	0.6	3	1.2	1	0.4
Cerv. adenitis, non-supp.	50	28.1	53	21.3	42	17.0
Cerv. adenitis, supp.	..	....	1	0.4	..	....
Abscess, peritons	..	....	..	...	1	0.4
Nephritis	2	1.1	3	1.2	3	1.2
Bacteremia	1	0.6	..	...	..	...
Abscess, soft parts	2	1.1	4	1.6	5	2.0
Paronychia	3	1.7	7	2.8	9	3.6
Scarlet fever, recurrent	..	...	..	...	1	0.4
Total cases treated	178		249		247	

TABLE XI

Serum Treatment of Scarlet Fever

Number of Complications per Case by Kind of Serum Used

Kind of Serum		Number of Complications per Case				Complications Group			Entire Group	
		1	2	3	4	No. of Cases	No. Compl.	Compl. per Case	No. of Cases	Compl. per Case
S	No.	59	42	8	3	112	179	1.6	178	1.0
	Per cent	52.6	37.5	7.2	2.7					
C	No.	85	33	10	2	130	189	1.5	249	0.76
	Per cent	65.4	25.4	7.7	1.5					
A	No.	88	31	6	3	128	180	1.4	247	0.72
	Per cent	68.7	24.2	4.7	2.3					

in the incidence rates of these complications for the convalescent and antitoxin-treated groups as was encountered during the first 6 months. Cases receiving special serum show a moderately higher rate for cervical adenitis and rhinitis, and a proportion twice as high for suppurative otitis media. The incidence of the remaining complications listed in the table is too small to warrant consideration.

Proportion of Cases with Multiple Complications—The number of complications per person in the specific serum groups show little variation (Table XI). A smaller proportion of cases receiving nonspecific serum developed but one complication. However, the proportion of cases having two complications was greater for this group. Taken in the aggregate, there is little difference between the serum groups with respect to the number of complications per complicated case.

When all cases in the respective groups are used as the basis for comparison, then the special group shows an average of one complication per case while the specific serum groups show less than one.

Dismissal Status—The remarks previously made with respect to the questionable value of serum on the dismissal status applies equally well to an analysis of the last 6 months' experience. The results previously noted are borne out in Table XII, for although the proportion of late dismissals is higher in the group which received special serum, yet the difference between this group and those receiving specific serum is of slight consequence. The difference between the convalescent serum group and the antitoxin group is practically nil. It will be recalled that on cursory analysis of the first 6 months' experience there appeared to be a real difference in the

TABLE XII

Serum Treatment of Scarlet Fever

Dismissal Status of Cases Admitted to Hospital

Age	Total in Group			Late Dismissals			Proportion of Late Dismissals		
	S	C	A	S	C	A	S	C	A
Under 1 yr.	..	1	..	..	1	..	....	....	....
1-4 "	30	56	57	20	24	25	51.3	42.9	43.9
5-9 "	82	96	116	17	17	19	20.7	17.7	16.4
10-14 "	36	58	48	5	6	4	13.9	10.3	6.2
15-19 "	8	11	6	..	1	3	....	....	50.0
20+	13	27	20	3	3	2	23.1	9.1	10.0
Totals	178	249	247	45	52	53	25.3	20.9	21.5

proportion of late dismissals between the convalescent serum group and the antitoxin group, but this was not borne out by test. Thus, the second 6 months' experience is in keeping with that of the first 6 months.

COMMENT

During the last half of the study, 3 sera were used; 1 was nonspecific, and 2 were specific. For all factors tested, specific sera showed better results than did the nonspecific serum. Furthermore, the results obtained with specific serum bear out the experience noted during the first 6 months, namely, that no real difference was demonstrated with respect to their therapeutic value under the conditions of the study. It would appear then that on the basis of the year's study, convalescent serum and scarlet fever antitoxin proved equally effective in the treatment of moderately severe scarlet fever.

It is interesting to conjecture the reason for the similarity in therapeutic effect exhibited by convalescent serum and antitoxin in the doses administered. Several possibilities come to mind. Because this experience covers a single epidemic cycle, one might object that the test period is too short, and that for this reason no real benefit has been demonstrated. The test period might well be extended, but the objection would appear to be less pertinent when the therapeutic result obtained with nonspecific serum is contrasted with that obtained when specific sera were used. The differences in some instances are striking and all are in the same direction, namely, in favor of specific sera. This reason does not appear to be tenable.

A second possibility is the presence in both sera of an antibody other than an antitoxin or an antibacterial substance to which their similar therapeutic effect might be attributed. This is not likely.

A third possibility is that scarlet fever is at present rather mild in Detroit as it is generally in the United States, and that use of either convalescent serum or antitoxin in the dosage used is sufficient to give satisfactory results. This might be interpreted in one of two ways: First, the antitoxin content of both sera is solely responsible for the therapeutic effect obtained. A few workers, particularly Rhoads and Gasul,¹ have implied, if not definitely stated, that the therapeutic value of any scarlet fever serum was entirely dependent upon its antitoxin content. It does not seem plausible that two sera, the ratio of whose antitoxin content is of the order of 100 to 1, should show the same therapeutic results when tested under control conditions. It must be borne in mind that the cases treated in this study were all of the moderately severe type of scarlet fever; all had temperatures ranging between 102° and 105° upon admission to hospital, and all other factors tested were similar. It seems unlikely that the antitoxin content alone determined for both sera the therapeutic results obtained. If this were the case, it would be equivalent to stating that equally good results would be obtained if a therapeutic dose of antitoxin consisting of not more than 60 units were used instead of one containing 6,000 units, the dosage used in this study. This does not appear to be very likely. Second, the therapeutic result demonstrated by antitoxin is due to its high antitoxin content, and a similar result in the case of convalescent serum is due to the presence of antibacterial substances, augmented slightly perhaps by the small amount of antitoxin to be found in this type of serum. This seems the most likely explanation.

SUMMARY AND CONCLUSIONS

The therapeutic effect of scarlet fever convalescent serum, scarlet fever anti-

toxin, and a nonspecific serum was studied during one year beginning August 1, 1936, and ending July 31, 1937. During this time, 995 moderately severe scarlet fever patients were admitted to hospital, and there received a single dose of one of the sera by the intramuscular route. The study was controlled by alternation in administration of sera. No statistical difference was demonstrated between the serum groups when certain status-on-admission factors were tested. From the therapeutic results obtained in this study, the following conclusions are drawn:

1. Convalescent serum and antitoxin in the dosage given and route utilized appear to

exert a similar therapeutic effect with respect to the factors studied.

2. The value a scarlatinal serum exhibits in the treatment of moderately severe scarlet fever does not appear to be gauged entirely by its antitoxin content.

3. If there is value in using nonspecific serum in the treatment of moderately severe scarlet fever, then there is greater value in using specific serum, namely, convalescent scarlet fever serum or scarlet fever antitoxin.

NOTE: The authors wish to express their appreciation to Dr. C. C. Young and Dr. W. A. Bunney for their assistance in the preparation of the scarlet fever antitoxin and the diphtheria antitoxin used in this study.

REFERENCE

1. Rhoads, Paul S., and Gasul, Benjamin M. Convalescent Scarlet Fever Serum and Commercial Antitoxin. *J.A.M.A.*, 102:2005 (June 16), 1934.

Forerunners of Modern Preventive Medicine

THE foundations of the administrative practice of modern preventive medicine are to be seen in the work of the practitioners of medicine in the eighteenth century. The work of Mead has been instanced in this connection, and he was the forerunner of others.

Heberden and Huxham studied fevers; Fothergill described malignant sore throat; Smellie and William Hunter practised and advanced the art of obstetrics; and Charles White applied antiseptic principles to it; Haygarth of Chester introduced notification and isolation of infectious disease; Richard Bradley studied plague at Marseilles; Sir John Pringle began hygienic reform in the British Army; Lind laid

down principles for the abolition of scurvy among seamen and the prevention of typhus fever; Sir George Baker wrote on the cause of Devonshire colic and palsy; Sir Gilbert Blane studied the diseases of the Navy; Percival denounced the lack of hygiene in crowded factory towns and initiated "industrial welfare"; and Edward Jenner introduced vaccination for smallpox in place of the inoculation method practised for seventy years before.

Thus, much research work had been and was being done in fields where the safety of the community and the interest of the practitioner coincided. Walter Elliot, Minister of Health, Health and The State, *Brit.M.J.* Feb. 25, 1939.

Social Security Needs for Vital Statistics Records*

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THE administration of the social security program involves the collection of a large volume of vital and economic data pertaining to persons covered by the old-age insurance, the unemployment compensation, and the old-age assistance provisions of the Social Security Act. The present discussion is concerned particularly with the significance and relationship of vital statistics records to the data arising out of the administrative operations of the Bureau of Old-Age Insurance.

It was originally estimated that there would be approximately 26 million persons whose wages would be taxable under Title VIII of the Act. As a matter of fact there are now more than 41 million persons with account numbers, with about 32 million persons already accumulating wage credits.

STATISTICAL ITEMS IN INSURANCE CLAIM RECORDS

The applications for account numbers furnish certain essential data regarding the applicant, including his name, residence, age at last birthday, date of birth (subject to later verifica-

tion), place of birth, sex, color, date of first employment in a taxable occupation after November 24, 1936, father's name and mother's maiden name.

Since the amount of the old-age benefit is determined on the basis of the taxable wages earned since January 1, 1937, an informational report based on the employer's tax return is required. This provides additional economic information, including the period of employment, the employer's name and account number, the total taxable wages earned by the employee, and the state in which such wages were paid. For each registered employee there has been established a wage ledger sheet with a record of wages earned during each half of the year 1937. These wages can be tabulated for each half of that year and for each quarter of the year 1938 and (if quarterly reporting continues) thereafter. Under the present provisions of the Social Security Act, monthly benefits will not become payable until January 1, 1942.

During the first 5 years of the old-age insurance program, lump sum settlements of claims are payable for each covered wage earner who dies or who attains age 65. To date there have been 213,137 claims filed, of which 117,852 were death and 95,285 were

* Read before the Vital Statistics Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 25, 1938.

age-65 attainment cases. The amount payable in each case is $3\frac{1}{2}$ per cent of the total taxable wages earned by the employee since January 1, 1937. The number of claims will increase as time goes on, the ultimate limit being the actual number of deaths plus the age-65 attainments among covered wage earners.

In the development and adjudication of these claims many items of statistical information are obtained, some of which have not hitherto been available from so satisfactory a source, for so large a number of persons, or with so high a degree of accuracy. This body of information includes the following:

A. All Claims

1. Employee's account number
2. Type of claim (life or age-65 attainment)
3. Origin of claim (state and field office)
4. Domicile of wage earner at time of filing application or at time of death
5. Sex
6. Color or race
7. Occupation
8. Total wages upon which amount of claim is based
9. Amount of claim
10. Place of birth
11. Date of birth
12. Number of different employers (since January 1, 1937)

B. Death Claims

1. Age at death
2. Place of death
3. Date of death
4. Marital status of wage earner at time of claim
5. Age of spouse
6. Number of children, by age
7. Number and relationship of payees to wage earner
8. Amount of expenses in last illness
9. Amount of funeral expenses

C. Age-65 Attainments

1. Type of evidence required to establish date of birth on life claims
2. Date of attainment of age 65

Both life and death claims are of interest from the standpoint of vital statistics.

The characteristics of our 41 million potential claimants have been de-

termined from a 10 per cent sample. This population is, of course, dynamic. Additions to this registered population are being made constantly as young persons enter the labor market and as workers formerly in non-covered occupations shift to covered employments. Subtractions from the registered population occur from two causes only, death and attainment of age 65. It must be pointed out that the shifting of an employee from covered to non-covered employment does not change his status as a potential claimant nor subtract him from the total registered population. Such an employee may, at any later time prior to death or attainment of age 65, return to covered employment and subsequently qualify as a claimant.

In estimating the expected subtractions from our registered population use must be made of the mortality statistics and of the life tables of the U. S. Bureau of the Census. Thus the Social Security program has, and will continue to have, pressing need of vital statistics records.

May we depart for a moment from consideration of the record forms and the statistical data involved in the administration of the system which is now in operation. You will be interested in some contemplated changes in the present system which are being actively explored and which, if adopted, would have substantial implications for statistical problems of coming years. As many of you know, the President has suggested to the Social Security Board that it examine the possibility of liberalizing the old-age insurance benefits. He has specifically raised questions concerning the possibility of providing benefits not only for those insured workers who attain old age, but also for aged wives and widows and for young children of persons dying before reaching retirement age. The Social Security Board is studying the possi-

bility of such liberalization of the old-age insurance benefits, and in addition, is exploring the possibility of providing benefits for workers who become permanently and totally disabled before attaining retirement age.

It is, of course, too soon to say what the results of these studies will be. We would at this time only call to your attention that if any or all of these contemplated new benefits should become part of the social insurance system, the vital statistics needs will be considerably expanded. For example, records concerning marital status and family relationships will become important. Many types of claims will involve statistical records concerning the relationship of parent to child, and there will be need to know the age of a child who might be eligible to dependent children's benefits. Accordingly, the administration of the system may become as actively concerned with birth records as with death records—birth records being important in establishing not only parent-child relationship, but also the age of a child. It may, therefore, become desirable or necessary not only that the death certificate should carry an account number, but also that the birth certificate should carry the account number of either parent or of both parents. Obviously the problems involved in making birth certificates useful for Social Security purposes are closely related to problems we now are facing in respect to death certificates.

THE RÔLE OF BIRTH CERTIFICATES IN OLD-AGE INSURANCE ADMINISTRATION

For administrative reasons, it is necessary in the case of life claims to establish the exact age of the wage earner, and in the case of death claims to establish the fact and date of death. Owing to the comparatively recent development of birth registration in the United States, most persons who be-

come 65 years of age during the period 1937-1942 will be unable to obtain birth certificates. Moreover, since the claims are for small amounts during the early years of the old-age insurance program, the Social Security Board has been disinclined to impose any expense upon the claimants, either for certified copies of birth or death certificates, for notary fees, or for other purposes.

However, as the program progresses, and especially when monthly benefits become payable, it will be necessary to simplify the procedure for establishing proof of age. The ideal proof of age is a birth certificate filed under the regularly established birth registration machinery. As time goes on, more and more of the wage earners will be able to obtain such certificates filed at the time of birth, or within the period for delayed registrations permitted by the respective state registration laws.

The problem of delayed registration has been given special consideration during recent years, formerly by a committee of the Vital Statistics Section under the chairmanship of Dr. Stewart Thompson, and now by a committee of the American Association of State Registration Executives, under the chairmanship of Dr. Martin B. Woodward. The Social Security Board will follow with interest the work of this committee. It is recognized that any legislation permitting registration of births long after their occurrence must be carefully safeguarded against fraud and inaccuracy. Nevertheless, if some solution satisfactory to the state registrars could be devised for this problem, we would be able to rely upon the birth certificate as a suitable proof of age. Lacking such a solution, and until the time when all wage earners will have been born subsequent to the establishment of effective birth registration, we must rely upon other methods of proving age. In the meantime, every appropriate effort should be made

to strengthen the existing system of birth registration.

But proof of age is not the only purpose which can be served by the birth certificate. If dependent children's benefits were provided, proof of relationship would be also served. In addition, information on the social and economic status of our covered wage earners would be helpful in administration and in providing the statistical basis for revisions in the Act which may have to be made from time to time.

As a background for these and other studies it is necessary to give special attention to the standardization of statistical classifications as to special items of information. Let us digress at this point from consideration of birth certificates to illustrate the problem. Among the items which require special classification codes, we might mention occupation and industry. Several attempts have been made to harmonize the occupational classifications now being used by different branches of the federal government, such as the Bureau of the Census, the Works Progress Administration, the Bureau of Labor Statistics, and the Social Security Board.

The Social Security Board is co-operating with the Central Statistical Board and the American Statistical Association in developing an occupational code which can yield comparable results when applied to occupational information obtained from employers, from birth and death certificates, from U. S. Employment Service records, or from population census schedules. The occupation of each old-age insurance claimant is furnished on the employers' report form, and tests have established that this is a satisfactory source of such information. It is hoped to ascertain from the same source the occupation of nearly all holders of Social Security Account Numbers. The availability of occupational data concerning so many wage earners from such a reliable

source is most reassuring to statisticians interested in the study of occupational variations in mortality and in studies of births by social and economic status of the parents. This new opportunity to develop useful statistics by relating the existing birth and death information to the wage records and claims data of the Social Security Board justifies us in looking forward to the development in the United States of a new basis for fruitful study of mortality, fertility, and other population problems.

THE RÔLE OF DEATH CERTIFICATES IN OLD-AGE INSURANCE ADMINISTRATION

The death certificate has an even greater significance to old-age insurance administration. As noted, it is necessary during these first 5 years to have prompt notification, with proof, of the fact and date of death. A certified copy of the death certificate would be desirable for both administrative and statistical purposes but for the fact that we must have proof of death before the monthly reports of the local registrars will have reached the state registrars. Even in these early years of the old-age insurance program, when claims are for relatively small amounts, 56 per cent of the applications are filed within 45 days. Nearly half of these, or 25 per cent of the total, are filed within 15 days. Promptness of reporting may be expected to be even more striking as the size of claim increases. Unless we devise some method of obtaining notification and proof within less than 10 days after the fact of death, our field agents will frequently be obliged to obtain information direct from local registrars.

In order to avoid both the annoyance of these officials and the numerous searches in their confidential files which would be necessary, it is proposed to have a special death certificate printed by the Social Security

Board and distributed to the local registrars through the existing registration machinery. This certificate would be filled out at the time of issuing the burial permit and mailed direct to the Bureau of Old-Age Insurance.

This special certificate will not carry all the items required on the Standard Certificate of Death. It will not include, for example, any of the items which relate to cause of death. Such information can be more reliably obtained for statistical purposes from the Division of Vital Statistics in the Bureau of the Census, where the cause is coded according to the *International List of Causes of Death*, complete data being obtained if necessary by querying directly to the attending physician.

This special certificate will, however, include the name, sex, race, age at death, place and date of death, and such other identifying personal particulars as are necessary or helpful to the development and adjudication of old-age insurance claims. After monthly benefits become payable in 1942 (or before then if the Act is amended), such a certificate will enable the board to determine promptly when payments should cease or when they should be made payable to beneficiaries covered by the Social Security Act instead of to the deceased wage earners. Without some very prompt means of ascertaining the fact of death much trouble and expense may be involved in recoveries from their estates of overpayments or incorrect payments to beneficiaries.

The procedure proposed for obtaining the special death certificates is to have them printed by the Social Security Board, bound in pads, and distributed to the local registrars through the state registrars' offices, along with the regular supplies of state certificate blanks. The Social Security certificates will be in duplicate, printed on colored paper. The local registrar will execute

the forms in duplicate at the time of issuing the burial permit, being asked to take special pains to insure that the Social Security Account Number is copied correctly. The original of the special certificate will be mailed at once to the Social Security Board in an official return envelope, a supply of which will have been received with the blank forms. The duplicate will be attached to the original state certificate and forwarded to the state registrar with the routine monthly report required by local regulations.

In the state office, the duplicate copy of the Social Security Board certificate will be checked and forwarded to the U. S. Bureau of the Census with the regular shipment of transcripts. In the processing of the transcripts in the Bureau of the Census, the cause-of-death code will be entered on the Social Security Board duplicate and forwarded to the Bureau of Old-Age Insurance. Thus, the original copy having been mailed direct by the local registrar, will accomplish the purpose of establishing, for Old-Age Insurance purposes, prompt notification of the fact and date of death; and the duplicate copy, arriving some weeks later, will bring to us from the Division of Vital Statistics of the Bureau, the cause-of-death code which will then be punched on our claims cards.

This suggested plan and procedure has been discussed with Dr. Dunn and Dr. Collinson of the Bureau, who have generously collaborated in the development of the procedures, with members of the Vital Statistics Section Council, and with several of the state registrars with whom there has been opportunity for conference. The proposal is placed before you today for consideration and with the hope that your discussion will help us to develop a procedure which will be acceptable to all concerned. Needless to say, it is expected that the Social Security Board will arrange mutually satisfactory com-

pensation both to state and local registrars.

Other points on which we invite your comments at the session today are the

inclusion of the Social Security Account Number on the death certificate and the Account Numbers of the parents on the birth certificate.

DISCUSSION

THOMAS W. CHAMBERLAIN

State Board of Health, Jefferson City, Mo.

MR. Smith has very ably presented the needs of the Social Security Old-Age Insurance Division. The proposed plan for furnishing blanks in duplicate to the registrar seems to be a practical and simple solution of the problem of securing proof of death promptly. Mr. Smith's hint of compensation to the local registrar is very interesting and I trust that we will receive further information. Some additional form of remuneration to the local registrar should reduce his complaints of overwork with underpayment to a minimum and generally make the job of local registrar more interesting.

However, this is not the whole problem; Mr. Smith has suggested a much greater one. It is evident from his remarks that we have experienced only the beginning of the demand that will eventually be made for our services. It may discourage some of us to learn of the probability of increased demands in the future when those of the present are so difficult. In meeting the demands of the present the states have met the problem in various ways, some of which are: the training and supervising of one or more clerks from the state Social Security office: the requirement that all inquiries originate in the local registrar's office and, in one instance, the neglect of regular and necessary duties in the vital statistics bureau. In striving to meet these de-

mands we have acknowledged that one of the most important duties in vital statistics is being of service to our people. It follows then that we must develop with the social legislation of today in order that we may continue to be of service.

A nation-wide social security program calls for a nation-wide system of vital statistics. The adoption of the new certificate forms will not be sufficient. We must standardize our methods as well as our forms. We must replace our present laws with a new model law. We must establish minimum standards for delayed certificates, for corrections or amendments, for adopted children's certificates, and for other procedures. We must persuade our health officers of the need for increased personnel and equipment in anticipation of what lies before us.

We are all proud of the voluntary relationship between the states and the U. S. Bureau of the Census. It is within our power to better our record and make an even greater contribution to the health and welfare of our own people and those of other states by a voluntary agreement on methods in vital statistics.

All this has been said many times in the past by those much better qualified than I, but it can be done, and it should be done, now. If we postpone action there is a possibility that we

may compel social agencies to organize their own machinery for the collection of vital statistics data independently of ours. It is only fair to point out, however, that no such attempt has been initiated by the Old-Age In-

surance division of the Social Security Board.

As a newcomer in vital statistics, it seems very much in order that we hear from some of the more mature and experienced vital statisticians present.

Public Health

PUBLIC health is a comprehensive science. Many contribute to it—the engineer, the architect, the lawyer, the administrator, the sociologist, the chemist, the physicist, the physiologist, the biologist, the biochemist, and so forth. But the chief contributor is naturally the exponent of medicine. The doctor was at first faced with the problem of treating a disease, a departure from the normal. In order to recognize the disease he had to know

the condition and state of the healthy body. Hence the importance of anatomy and physiology in the medical curriculum. Next he was occupied in studying the causes of disease: *Felix qui potuit rerum cognoscere causas*. Thence it was a short step to study how these causes might be prevented from assailing the human healthy body—in other words, preventive medicine. Walter Elliot, Minister of Health, Health and the State. *Brit.M.J.* Feb. 26, 1939.

Potentialities of Public Health Engineering in Relation to the Social Security Act*

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PUBLIC health work under the Social Security Act is essentially a new program. The Act was passed in 1935 and funds became available about 2½ years ago. It is, therefore, too early to estimate its actual value on the basis of experience. This legislation and the regulations under which it is administered obviously contemplate a long-range program, and one of increasing influence. Remarkable progress has already been attained. The most significant accomplishment of this program has been the formulation and wide acceptance of fundamental administrative policies which should serve as the foundation for greater achievements.

A discussion of the encouraging possibilities afforded by a new program is attended by certain dangers two of which may be mentioned. Undue optimism, incited by favorable reports may lead to overdevelopment of the immediate expectations of those concerned. An enthusiasm which is based on "wishful thinking" rather than careful analysis may not be sustained by later experience and ultimately may

contribute to a decline in morale when inspiration for continued effort is needed. On the other hand, there is danger that a discussion of potentialities may be too realistic and confined only to immediate and superficial values. The men who have developed this program, while practical, have been idealistic in the truest sense, dealing in fundamental principles and visualizing the developments of the future. The administrative policies of the program are not limited by present practice. They can, and undoubtedly will, be readjusted so as to utilize advances in knowledge and improvements in procedure.

The writer has no inclination to "overstate the case" of public health engineering in relation to the Social Security Act or to arouse an unwarranted degree of optimism. The total annual appropriation to the U. S. Public Health Service for all purposes in this program is relatively small—about 8 cents per capita. Obviously the immediate development of adequate public health engineering facilities to serve all areas in the country cannot be expected. The outlook of public health engineering in the Social Security Program is indicated by encouragement of the scientific approach to public health problems

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through professional education and research; and by the recognition of environmental sanitation as an essential part of public health programs—federal, state, and local. In this paper I wish to emphasize some unparalleled opportunities afforded by this program to extend and improve our methods in public health engineering and to develop environmental hygiene in its broader aspects.

FUNDAMENTAL ASPECTS

There is need for a more unified point of view concerning the rôle of the engineer in public health work. Public health engineering is a recent development and it has not yet outgrown the fact that it had its origin in two different fields of activity; namely, sanitary engineering and sanitary inspection. From the standpoint of time and service rendered neither of these was primarily public health. Sanitary engineering is concerned especially with design, construction, and operation. Although important benefits to public health are provided by sanitary engineering, a sanitary engineer, engaged in the design and construction of a water works system, a sewage treatment plant, or a garbage incinerator, devotes more attention to materials of construction, hydraulics and heat losses than to morbidity rates, sources and modes of infection and physiological responses of human beings to their environment.

Sanitary inspection was the forerunner of municipal and rural public health engineering. This activity was intended to reduce environmental health hazards but it has been, and frequently is, unscientific as a public health procedure. For example, a recent survey of the sanitation program in a city with an excellent health department shows that, exclusive of milk and food control, 34 per cent of the accomplishments recorded as sanitation were abatements

of nuisances pertaining to refuse, garbage, and trash. Many of the earlier programs of sanitary inspection consisted almost entirely of routine law enforcement and the abatement of minor nuisances which had no direct relation to public health.

Public health engineering is more comprehensive and, in reality, includes the public health aspects of both sanitary inspection and sanitary engineering. The dominant characteristic of public health engineering is that its chief concern is with public health activities. The prestige and potentialities of public health engineering as a professional entity are based upon the close relation of environment to human health, and upon the further fact that adjustment of the environment involves the application of engineering principles. This axiomatic and oft-repeated basis of this field was well described by Holmquist and Dappert about a year ago in a discussion of the "Expanding Scope of Engineering in State Health Departments."¹ They stated:

Public health work deals with the application of science to the problems of man's relation to his environment. The task of the public health engineer is to assure necessary favorable conditions and to prevent or minimize the unfavorable. The air we breathe, the water we drink, the food we eat, the light by which we see, the people with whom we come in contact—in fact, any of the conditions of competitive life under which we live—are all a part of our environment. And just as long and broad as you can conceive environment to be, just that long and broad is the field of public health.

Public health engineering is a composite specialty of the engineering profession. It is related to, but does not embrace, many other phases of engineering; it does embrace a number of functions which have not been generally recognized as engineering. It is based upon the same fundamental sciences as other branches of engineering—chemistry, biology, mathematics, mechanics,

and physics. The essential difference is that while its basis is engineering, its primary objectives, and therefore its principal criteria of efficiency and economy, are valued in terms of human health. For example, a sanitary engineer may construct a water purification plant which is a marvel of engineering efficiency and economy. But unless it increases the degree of protection against ill-health or tends to promote better health among people it is a failure as a public health engineering project. On the other hand, a worker who uses his knowledge of engineering effectively in a program of education against environmental health hazards renders a valuable service. Many activities such as rural sanitation, school sanitation, or the routine inspection of food and milk supplies, may appear commonplace and non-technical. However, a background of technical knowledge and an engineering point of view are necessary for the solution of such environmental problems. Moreover, this provides community-wide protection of value just as in the supervision of the larger sanitary engineering utilities, as public water supplies and sewage disposal systems.

Probably much of the confusion and duplication of effort in environmental sanitation activities are caused by failure to comprehend fully and accept the expanded rôle of engineering in public health work. Engineering schools have been disregarding of this development; some health officers fail to appreciate it; and the perspective of many engineers now engaged in public health work is too restricted by traditional concepts of what engineering does or does not include.

ESSENTIAL BASES OF ADVANCEMENT

The Social Security Act demands the establishment and maintenance of "adequate public health services." This is a challenge which necessitates

continued study and analysis of the fundamental requirements in public health engineering.

The late George W. Fuller, consulting engineer and past president of the American Public Health Association, was active in helping to define the field of the sanitary or public health engineer. In a paper² read at a general session of the 1925 meeting in St. Louis, he stressed the importance of education, applied research, and sound administration as means of bettering the performance of workers in this field. Three years ago Hyde contributed a careful analysis of the functions and opportunities of the engineer in public health work.³ Abel Wolman has repeatedly urged further expansion of public health engineering practice into unexplored fields^{4, 5}; and he has directed attention to the importance of coördination of levels of health services—federal, state, and local.⁶ Other thoughtful leaders in public health believe that a comprehensive reëxamination of the causal relationships and practical values in environmental sanitation is most promising as a guide to effective planning and administration.

This brief review of basic considerations suggests five major objectives for further advancement of public health engineering as a result of the Social Security Program:

1. An effective program of education concerning environmental sanitation which will make use of factual knowledge of public health engineering and effectively utilize educational facilities in health departments to reach the general public as well as special groups.

2. Professional education of public health engineering personnel through postgraduate courses in universities and by supervised field experience; and adequate instruction in the fundamentals of public health as a part of the undergraduate curricula of engineering schools.

3. A comprehensive program of research, both fundamental and practical, including studies of the relationship of environmental factors to human health, the administration

of state and local programs of sanitation and engineering methods in public health.

4. Organization and direction of federal, state, and local activities in environmental sanitation, in a manner which will unify the program, provide supervision and effective planning, use the qualifications of engineering personnel efficiently, and avoid unnecessary duplication of effort.

5. To develop and improve public health engineering procedures so as to increase their effectiveness and be conducive to further extensions of environmental control that may be justified on the basis of present or future knowledge.

The Social Security Act specifically provides for the attainment of these objectives. Its administration has emphasized special activities in health education, professional education of personnel, coördination of research with practice, and expansion of the scope of environmental sanitation. Large increases in the number of public health engineers and sanitation assistants have already been made. Public health engineering activities have been greatly extended and the ground-work has been laid for a coördinated approach to the more difficult aspects of environmental hygiene. Further progress appears to depend primarily upon the perspective, the initiative and the skill of those engaged in this field.

HEALTH EDUCATION

Popular health instruction in the fundamentals of sanitation is essential to advancement. Past experience has demonstrated that it is possible to interpret scientific facts and present them to the public in a manner which will elicit interest and coöperation. But to be effective such an effort must be well organized and specific. Specialists in health education have been made more generally available in states and in the larger local health departments. Their assistance can also be of great value in disseminating available knowledge concerning public health engineering practices.

The methods and materials used must be well adapted to obtain the interest of important groups such as municipal officials, industrial officials, property owners, engineers, architects, plumbers, equipment dealers, and a variety of organizations. Of particular interest are more recent efforts to expand health education by instruction in public schools. Teachers are better prepared to teach public health to children; they are prepared to utilize information provided by public health engineers and sub-professional personnel in sanitation related to the local school and community. A common weakness of public health engineering in the past has been failure to make known to others the full extent of its problems and accomplishments. With more adequate personnel and assistance general health education should be an increasingly productive field in this phase of technical service.

PROFESSIONAL EDUCATION OF ENGINEERS

From the standpoint of the future development of public health engineering the most important result of the Social Security Program is increased recognition of the necessity for professional education of public health workers. Guiding principles for the postgraduate instruction of public health engineers recommended by this Association are being followed quite closely in several universities.⁷ The educational facilities which are now available and progress in the education of public health engineers, sanitarians, and sanitarian assistants (sanitary inspectors) are to be discussed in a later paper on this program. It now seems probable that public health engineering will be developed as a well defined specialty of the engineering profession and that more adequate facilities for graduate study leading to degrees in this field will be provided.

The influence which the Social Se-

curity program may have upon the integration of public health instruction in undergraduate engineering courses is problematical but encouraging. The practice of engineering in almost any field has manifold public health aspects. An understanding by all engineers of the many conditions of environment which have an influence upon health and co-operation with official health agencies will be more and more necessary. Also, it seems apparent that an increasing number of engineering graduates will decide to specialize in public health engineering. An introduction to public health with emphasis upon its engineering aspects and fundamental courses in the biological and social sciences for all engineering students prior to graduation are particularly desirable. This should be considered as basic instruction and not be placed in the same category as the optional programs of study now offered by about 25 engineering schools for students who elect courses in sanitary or public health engineering.

The potentialities of such a development are impressive. It would tend to make engineers more conscious of public health problems in their own work and more coöperative with public health engineering activities. Then too, engineering graduates would be better able to decide whether they should specialize in public health engineering and would more fully realize the need for postgraduate study.

RESEARCH

We are constantly reminded that much available knowledge is not applied and yet a major difficulty in attempting to extend and improve the application of public health engineering is a lack of adequate information. Success in sanitation is peculiarly dependent upon indirect methods—promotion, salesmanship, education, supervision, stimulation, and leadership. Effectively applied these methods mobilize the re-

sources of others and multiply the efforts of the public health engineer. But recommendations of expenditures for adjustments of the environment must be supported by convincing data regarding their public health value. Public health engineering supervision implies approval of particular methods of environmental control. This requires factual knowledge that the prescribed methods will be effective. Professional leadership must be based upon demonstrated needs and sound proposals for improvement. The necessary fund of fundamental and practical knowledge can be maintained only by a well planned program of research.

The biological, epidemiological, and administrative phases of major engineering problems need to be studied concurrently, and this should be done in coöperation with federal, state, and local health departments. Laboratory experiments and demonstrations are essential; but more extensive studies representing the conditions of actual practice also are of greatest value. Studies of this kind can be conducted advantageously in connection with established public health programs where suitable public health engineering problems and improvements are available. The flexibility and coördination which characterize the public health program under the Social Security Act will prove invaluable assets in engineering research.

The spirit of research, as expressed in a well defined program, may be made productive as shown by past experience in the improvement of water supplies, sewage disposal, milk sanitation, and other established public health engineering activities. A better understanding of such problems and the initial impetus toward their solution came largely from official health departments. But after interest was aroused, and desirable objectives had been tentatively defined, a tremendous

amount of additional study and advancement were contributed by other public, private, and commercial agencies in these fields. There are at present numerous important public health problems which appear to be closely related to environmental factors concerning which the value and methods of environmental control are not known. For example, the problems of pneumonia and other respiratory diseases, infant and child health, air pollution, and the varied aspects of housing present interesting and interrelated questions of great practical importance. Comprehensive studies and the initiation of environmental control in regard to such problems are extremely promising both as a direct approach and as a means of stimulating more widespread interest and activity.

UNITY AND COÖRDINATION OF PROGRAM

From the standpoint of administration the state is the predominant subdivision. It is important that the state-wide program of sanitation should be unified to coördinate all public health engineering functions from the most technical and specialized services in state health departments to the routine performances of local units. This concept presupposes unity of responsibility for the state engineering services and for the engineering supervision of local sanitation programs. Confusion of responsibility in regard to local sanitation work can be avoided by a clear distinction between professional direction and administrative control.

The Social Security Program has accelerated the expansion of local health service and has stimulated specialized services, such as malaria control and industrial hygiene, in state and local health organizations. These services include major engineering activities requiring close coördination. In some instances these activities have been

separated from other state engineering programs. However, in several states, all state and local sanitation activities have been reorganized and made a responsibility of the state division of public health engineering. This plan has the advantage of combining the direct public health engineering services of this division with the planning and professional supervision of all other sanitation activities in the entire state. The preparation and experience of the state corps of public health engineers are utilized without interference with administrative procedures which is conducive to both efficiency and economy.

Obviously, the revision of present methods of administration in the various states will be a slow process. However, the policies of the Social Security Program which demand scientific planning and adequate professional guidance should lead to more unified and stronger state and local health programs. No standard pattern of organization can be applied. There is, however, need for less attention to organization and more attention to service. Regardless of the administrative boundaries which may be shown on an organization chart, the services of public health engineers with adequate preparation and experience will be recognized as indispensable in the administration of state-wide sanitation programs.

QUALIFIED PERSONNEL—AN AID TO EFFICIENT PERFORMANCE

In order that the public health engineering program may translate worthy plans into definite accomplishments, sound technics and high standards of practice are, of course, necessary. Waller⁸ has aptly compared environmental sanitation to the construction of a bridge or "skyscraper." The health officer may be compared with the architect; he studies the problem and prepares a functional plan of sanitation which will meet the essential needs and

be in harmony with related conditions. The public health engineer is responsible for the details of the plan, specification of methods and materials, and direct supervision of the sub-professional workers who assist in carrying the design to completion. The usefulness and stability of an engineering structure are based first of all upon demonstrated needs, sound economics, and competent design. However, in environmental sanitation adequate qualifications of both professional and sub-professional personnel are essential to the effectiveness and stability of the program.

A high level of minimum qualifications for public health engineers and sanitation personnel has been adopted by the Governing Council of this Association. Some may think that the qualifications suggested are too high to be generally attainable, but it should be recalled that about twenty years ago the standards of quality for drinking water on interstate carriers adopted by the U. S. Treasury Department were criticised as too stringent to have general value. Although these standards now are even more exacting they are universally accepted by public health officials in this country. Nearly all public water supplies far surpass the minimum requirements, and these standards of quality are considered practicable even for private water supplies and swimming pools. The unattainable standard of today becomes the accepted minimum of tomorrow.

It would be a great mistake to set our ultimate aims for qualified personnel too low or fail to use every advantage offered by the Social Security program in this direction. Nothing is more discouraging or uneconomical than to attempt to obtain good work with incompetent workers. Hyde's study in 1935³ indicated that there were "probably less than 25 public health engineers regularly employed in 21 county-unit or district health de-

partments in 10 states." As of December 31, 1937, coöperative state and federal budgets included 159 whole-time engineers employed by local county or district health departments in 21 states. Practically all of these have completed at least a short course of postgraduate instruction in public health, and an increasing number are being enrolled for a full year of graduate study in public health engineering. This indicates that in 3 years there has been more than a six-fold increase in the number of public health engineers in local health departments, exclusive of purely municipal departments; and more than double the number of states having at least one local department in which engineering supervision of sanitation has been provided. Such rapid progress in the local employment of graduate engineers and in arrangement for their professional education under the Social Security Program is merely one indication of the possibilities for the future.

Public health engineering has advanced rapidly and results have been obtained wherever responsibilities have been assumed and facilities for service provided. Effective engineering methods have been devised, more direct administrative procedures have been employed, and more competent personnel has been developed. The rapid expansion of service under the Social Security Act is coupled with a responsibility for maximum results in the use of funds to justify a continuation of the facilities which have been made available. This will result in more specific and efficient application of public health engineering knowledge and therefore in greater professional prestige and individual opportunity.

REFERENCES

1. Holmquist, C. A., and Dappert, A. F. Expanding Scope of Engineering in State Health Departments. *Munic. Sanitation*, 8, 10:530 (Oct.), 1937.
2. Fuller, George W. The Place of Sanitary En-

gineering in Public Health Activities. *A.J.P.H.*, 15, 12:1069-1073 (Dec.), 1925.

3. Hyde, C. G. The Trained Public Health Engineer in Public Health Departments. *A.J.P.H.*, 26, 7:697-710 (July), 1936.

4. Wolman, Abel. Values in the Control of Environment. *A.J.P.H.*, 15, 3:189-194 (Mar.), 1925.

5. Wolman, Abel. Recent Trends in Public Health Engineering Practice. *A.J.P.H.*, 27, 1:43-49 (Jan.). 1937.

6. Wolman, Abel. Changing Public Health Practices and Problems. *A.J.P.H.*, 27, 10:1029-1035 (Oct.), 1937.

7. American Public Health Association Committee on Professional Education, Report on the Educational Qualifications of Public Health Engineers—Approved October, 1937.

8. Waller, C. E. Rôle of the Sanitary Inspector in the Public Health Program. *A.J.P.H.*, 25, 3:323-327 (Mar.), 1935.

THE opportunities of the school physician are so unique that they merit the envy of the classroom teacher in other subjects. Our teaching is done by a combination of the classroom and clinic method whereby the learner is at once the object of the demonstration and the beneficiary of the method. What could be more ideal? How much simpler the teaching of mathematics would be if,

each time the student learned a new equation, he could be relieved of a distressing physical condition. How much simpler would be the English teacher's job if students consulted him with the same motives of personal concern and the same receptiveness to instruction as they have when they consult the college physician.—Charles E. Shepard, M.D., *Journal-Lancet*, Feb., 1939, p. 70.

Preparation of the Nurse of the Future*

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NO one who keeps in touch with current trends in public health can fail to see the rapidly growing tendency to accept greater if not complete responsibility for the health of the people of this nation. Assistance in influencing the economic, housing, genetic, and nutritional factors underlying health problems are among the newer activities which now engage its attention. Interest in a much greater scope of disease problems exists than even 10 years ago. So logical a part of public health does the provision of adequate medical and nursing care of those who are ill now seem, because of the consequences of its lack, that its inclusion in community health programs is rapidly becoming a major issue. Just how this will be accomplished is of course one of the most provocative social problems of the hour, but that in most communities public health administrators will be responsible for the coordination of efforts and the machinery to provide that not otherwise cared for, will be doubted only by those who believe a non-medical type of agency can more adequately administer this service. The health

administrator will, if this is true, study with increasing intensity all of the factors that are involved in this care. He will conscientiously investigate all morbidity situations and, while continuing to apply this epidemiological methodology toward their prevention, will, on the other hand, survey the amount and quality of care available, what is lacking, and how it can be provided or strengthened.

If this is a true picture of the future, and our N.O.P.H.N. definition of public health nursing which designates our responsibility as that of giving nursing assistance in the whole public health program, is sound, then we shall see that the community and its health administrator are going to need and expect nursing directors and supervisors who can give them expert assistance in analyzing the total nursing picture in their community. Not just the picture of the need for and the kind and quality and production of public health nurses but of institutional and private duty and practical nurses, in order to have that community or area adequately nursed. They are going to become, or should be helped to become, intensely interested in how all of those nurses are prepared and how that preparation could be improved so that every nurse will contribute to the improvement of the health of the community.

* Read before the Public Health Nursing Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 25, 1938.

It would seem therefore that there will be a great need for nurses with increasingly broad understanding of the whole social and nursing situation to fill these leadership positions.

Now let us try to think what we really want of the staff nurse of the future. Two avenues of divergence from the present average nurse present themselves. One is in the direction of more automaticity, i.e., training merely in skills and technics. The other is in the direction of real education in basic principles of science and sociology which will lead to self direction and creativeness. It is easy to sympathize with the many who favor the former divergence because of the greater ease and rapidity of preparation of nurses of this type and especially since many communities at present do not appreciate the deeper aspects of having their community "well nursed." A little reflection, however, by those experienced in public health convinces them that those communities probably need the most expert nurses to understand and break down prejudices and give leadership into newer ways of thinking. And if we want a large area such as a state or the nation to be "well nursed," I submit that there is but one way of having it done and that is to have in each community or health area nurses who have a broad conception of a vital community health plan, a scientific understanding of its component parts, who are capable and interested in studying what contribution nursing can make to that plan, and who have ability to assist in leading their community into carrying the plan into action. Any nurse who has been in position to compare nurses from a state or national horizon is convinced that in every area from New York to San Francisco there is a crying need for nurses of this ability, integrity, scientific knowledge, and spirit of service.

Possibly one reason for confusion as

to the trend we should take has arisen because well prepared nurses have been used to carry on functions which could be accomplished as well by those with little or no training. In the better thought-out nursing programs (both public health and institutional), this largely has been avoided by use of volunteer assistance. In the institutional field the use of a subsidiary worker such as New York State's new licensed practical nurse is an approach to that problem. It is not beyond conception that she may also be used in the community nursing service. If so, a plan should be made to have the two work hand in hand as nurse and nursing assistant. But let us make no mistake that our crying need is first for nurses who can plan and organize and nurse their area before we consider another group of paid assistants to amplify it.

Another factor of resistance to that type of nurse has been confusion of our medical associates who feel we are desirous of replacing them in medical functions. It has been my experience that the best equipped nurse is least guilty of creating that impression. She sees so much to be done in her nursing province that she runs less chance of trying to take on the medical officer's or physician's job herself.

If we really want this kind of staff nurses we must help the community to understand that the type of program suited to develop such leadership over the long range cannot always produce workers who are immediately skillful. We will have to see that potentially good material is patiently protected during this learning period in order that their ultimate contribution may be great. We must encourage this type of preparation of young women in sufficient numbers that each time we find such a promising person we shall not need to snatch her from field work for a supervisory position (often prematurely for her own good) and lose the benefit of her con-

tribution to improved field work, an inestimable loss for which the only correction I can see at present would be the return of every administrator, instructor, or supervisor to field work periodically. Incidentally I believe some new and better emphases in public health nursing would soon result.

How can such nurses be prepared? One way is to influence and assist those responsible for postgraduate courses. Fine! Do we do it? Too infrequently. When they endeavor to be more selective of their students we beg for exceptions or complain of their being too strict in their regulations, and then blame the college because all their output is not suitable material for our needs. We fail to keep in close touch with the college and tell them just what we shall expect of the nurses they educate. We have an increasing tendency to define our standards for postgraduate work in terms of procedures to be followed rather than goals to be achieved. We want a transformation in the nurse to be accomplished in a period of time too brief to give the basic underlying fundamentals. Then, too, we are very easy going employers, too unanalytical and avocal about the failures. From such reports the university could learn how to improve in the future. We do not plan generously for areas and personnel to give the field experience necessary to round out this preparation. This is particularly true of official agencies who are prone, not even to assist the nonofficial agency in so doing, saying they are too busy or too poor, and yet criticising the new appointees they accept because they do not have the health department point of view—merely a V.N.A. outlook.

But even if we corrected all these faults and were paragons of virtue as far as postgraduate education is concerned, I think there is not a public health nursing course director who would not say that still her greatest

problem is finding students with a sound basic scientific education and clinical experience upon which to build. If you do not know what I mean just try to inspire and teach a group of potential public health nurses how to assist in a communicable disease, tuberculosis, or syphilis program who have never had any experience in that field. I am not sure that Mary Beard will not go down in history as the outstanding public health nurse of our times in her insistence that the place to strengthen nurses for community work of the future is in the basic nursing course, and that all nurses need this broad understanding of community health.

But what do most of us in public health do about that? Mostly stand aside and consider it out of our province. Only a very small percentage of the public health nursing group belong to the National League of Nursing Education, which membership is the logical way to help.

Fortunately the few who have belonged have been sufficiently expressive of needs that there is every evidence that nurse educators now have their ear attuned to them. They are working arduously to find better ways of attracting and selecting young women with the basic personality qualities suggested above. The colossal reconstruction of the curriculum for schools of nursing¹ published last year recommends advanced educational standards of one or two years beyond high school and suggests liberal pre-professional requisites which will add to the student's general knowledge, her maturity of thought and judgment, and her cultural development. In the professional curriculum provision is made for greatly strengthening the social, biological, and physical sciences; emphasis is placed from the very beginning upon all nursing as health conservation; upon the family as the agency for promoting health,

and the child as the most malleable recipient; upon nutrition; upon groups of illnesses (including mental) now more amenable to control; upon the teaching function of the nurse; upon her own health and the enrichment of her own living. Wherever this curriculum can be followed a new generation of nurses will surely rise to challenge us.

But, as has been ably pointed out, there are a great many handicaps to its universal application. Ruth Hay classifies them as economic and educational.² Outstanding among the economic problems is the fact that the school of nursing is under control of the hospital, an institution whose primary interest is service rather than education. To be sure, the hospital is necessary to a school of nursing as a practice field, but there are great disadvantages to a control that accepts unfit students in order to fill a quota, keeps questionable or frankly undesirable students because they lend an extra pair of hands and feet, maintains a school in a hospital abominably lacking in variety of clinical experience which the nurse will later meet in any normal community, skimping the school budget for fancy equipment, luxurious appointments in private rooms, or for attractive landscaping. These practices are so universal that they are almost acceptable to us in public health who could, if alert, find many opportunities to lend excellent outside assistance to the nursing school director who is a voice crying in the wilderness to her board and community for the chance to conduct a real school of nursing or discontinue it and employ a graduate staff. A second economic problem is lack of endowments or governmental subsidy such as colleges of medicine, education, or other professions enjoy, which would permit enrichment of the program within a cost not prohibitive to the average young woman.

Outstanding among the educational problems are (1) students too immature to assimilate this service, (2) resistance of the medical profession to "too much training," (3) lack of preparation of the faculty to incorporate the health point of view of which they are frequently unconscious because they have not had experience in that field, (4) scarcity of public health nurses willing and equipped to assume positions on nursing school faculties, and (5) disinterest or lack of adequate preparation of public health agencies to provide field experience for rounding out this education.

Could we as public health workers help in any of these problems? Immeasurably! In the first place, participation in the local League is indicated; a careful study of the new *Curriculum Guide* would be good preparation for a conference with the nursing school directors in our area, at which we frankly ask if there are any ways in which we can help. And if in the meantime we interpreted this enriched program to our health administrator (who should appreciate its potentialities) and motivated him to interpret and support it with other physicians in the community, it might smooth considerably the road to its adoption. We need not accept a membership on their nursing school committee which *might* result, but we can use every opportunity to interest other influential community members in these nursing education problems; possibly we could spare or help them to find an experienced and qualified public health nurse who would be interested in a faculty position, or perhaps we could arrange to assist in the teaching program on a part-time basis ourselves.

We may not be able to offer an affiliation for students in our agency, but we could plan well ordered short observation periods for each nurse or possibly allow key members of the faculty to

have a 4 or 6 weeks experience in our organization. Perhaps this could be arranged on an exchange basis, lending our superior nurses who would give as well as gain. Both groups should profit by such a plan. There is no dearth of possible ways in which we could assist in better basic preparation of the nurse of the future, but there has been a lack of assumption of responsibility in that field which I feel can no longer be condoned if we are truly interested in the nurse of the future who will or will not see that her area is well nursed.

And now a few convictions concerning the actual preparation of the public health nurse of the rather near future, a problem you and I are meeting today. One of the most important contributions we could make would be to be highly selective of the nurses we employ. We could strengthen all nurse educators if we refused to retain nurses who did not give evidence of sound integrity, sufficient cultural background to meet people in all social stations with reasonable ease, or who could not speak the English language correctly or compose an acceptable letter. Likewise, we could register our disapproval of schools lacking in strong science courses, teaching instruction, or enriched clinical experiences, by not accepting their graduates until they have strengthened these deficiencies. Alumnae members so counselled soon take this information back to their alma mater.

As I have previously stated, the burden of this responsibility for field introduction falls on the nonofficial organization—one of their great contributions in my estimation. Lest those reared in that environment get the one-sided view of public health, these organizations must turn their attention to having their faculty and supervisors persons who have experienced different types of public health nursing; official as well as nonofficial,

rural as well as urban, specialized as well as generalized. Increasingly they should be persons with broad interests who are thoroughly active citizens in their own community and keenly attuned to professional problems through their participation as well as membership in professional organizations.

Not only must these nonofficial organizations see their true relationship to the community health plans—i.e., doing what the official agency is not yet prepared to undertake, but the official agency must demonstrate greater appreciation of the help of the nonofficial agency, be willing to talk over their plans frankly and discuss freely where the nonofficial agency can contribute most. They must trust that group well enough to help them work out the student or new staff introductory program, sharing as freely as possible opportunities for observation or participation within its program.

More emphasis must be placed on the goals and objectives of the organization rather than on the technics of procedure. Given a carefully selected nurse, well grounded in medical and health situations and basic principles of nursing care, take time to interest and inspire her in what can be done about them, and then challenge and encourage her to work out the best way to influence their improvement in a small area for which she is to be accountable, and one will rarely be disappointed in having a veritable dynamo of ideas and actions of a creative and coöperative nature. If she can learn that the supervisor is a sympathetic person with whom she can talk these over, who will protect the community and herself from the utterly unsafe or impossible parts of her plan but who will let her try and fail in a few from which she will learn lasting lessons; if she knows the supervisor will help her evaluate why the failure occurred and how it may be subsequently avoided, zeal and every-

day freshness in tackling even routine duties will result and a group of nurses with ability to contribute to better and easier outcomes in public health will be prepared. True, the supervisor will become less prominent as a "manager" of her district but she will experience a new and deeper satisfaction of the real teacher whose greatest aim is to produce proteges greater than herself, and incidentally she will save herself many details of administration.

A graduation and rotation of responsibilities from simple illness care through health teaching in families to teaching in groups, to making community contacts, to being responsible for keeping the whole staff well informed on trends in some certain phase of the work, to assisting in teaching students, until all has been given and gained of which the organization and nurse are capable, is a sound plan of preparation. The nurse should then be guided into seeing that her next step should be a broadening of her experience in another type of agency.

Out of such plans should grow nurses capable of developing into the supervisory or administrative positions which are to demand so much of the nurse of the future if she cares to take on this added responsibility for others. I hope, however, that many of this type of nurse are going to find the joy of the "master touch" in staff work, and with a fine preparation, a thirst for constantly reinforcing it with the new, a broad understanding sympathy with all the different organization approaches to solving the community health problem, and with a real interest in participating in professional affairs, will seek the niches where they feel they can best serve and demonstrate over long fruitful years the results of artistry and devotion in a community nursing service.

REFERENCES

1. *A Curriculum Guide for Schools of Nursing*, prepared by the Committee on Curriculum of the National League of Nursing Education, 1937.
2. Hay, Ruth W. Preparing Students for Community Service. *Am. J. Nurs.*, 37, 12:1373-79 (Dec.), 1937.

Science

"... We must beware of verbal lullabies that by melodious phrase and soothing rhythm sing to sleep our curiosity.

For when curiosity sleeps, science

stagnates."—Alfred J. Lotka, *Contact Points of Population Study with Related Branches of Science. Proc. Am. Philosophical Society*, Feb. 15, 1939, p. 618.

Interpreting the Physician and Making Him a Part of the Health Education Program*

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PERSONAL health education endeavors so to motivate human beings that they will follow such practices, and obtain such services, that an optimum of health will result.

With the exception of a few personal practices, most information which will contribute to health must be obtained from the physician to meet individual needs. Practising physicians, by and large, are an inarticulate-group, except, if I may add facetiously, in medical society meetings. They are doers, and not explainers, they say. This has come about to some extent as a hang-over from the days when the practice of medicine was reckoned by many as a sort of magic which the public did not expect to understand.

With freer communication, and an enlarged vocabulary, the average person wants to know what the words so freely used by physicians and others dealing with the practice of medicine mean, before he is willing to submit to procedures for which these words are used. As an example of this, any person who comes in contact with large numbers will realize how confusing just this

matter of "blood test" can be to the average person. A blood test may mean a Wassermann or a Kahn, or it may mean an estimation of the red and white blood cells, or it may mean blood taken for any number of other laboratory procedures.

Probably the idea of magic has remained attached to any procedure which has to do with the blood more persistently than to most practices in medical science. Need we be surprised then if the man in the street becomes over-responsive to the advertising of quacks which convince him that the source of his complaints can be discovered by placing a few drops of blood in an electrical contrivance? Likely he has had a leukocyte count; he may or may not have had a Wassermann or a Kahn; but in all probability some reputable physician has taken blood for some simple diagnostic procedure about which he has failed to educate the person involved. This is but one of the many instances which the everyday man experiences many, many times. A correct diagnosis of his illness may have been made as a result of the procedure, and he may have recovered from his illness, but he has learned little from it which will enable him to respect scientific services.

* Read before the Public Health Education Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 25, 1938.

There is little doubt that much of the health education of the future will have to come from the practising physician at the time he sees his patient, because preventive medicine deals more with the ways of living than with remedies. In the meantime, the established organizations which promote health education will have to find ways to provide this education. Those of us who deal with mass education ponder long and hard how specific education of this sort can be given to large numbers. The newspaper, radio, and printed matter can point the way but it requires much more than this general information to enable persons to think through their own problems and obtain what they need on one hand, and avoid becoming hypochondriacs on the other.

It is very easy to say to a community "Every child must be protected against diphtheria." It is easy again to tell the parents how this may be brought about, and the steps to be taken to ascertain whether the child has retained the protection; but if we stop here without teaching these parents, in a general way, what happens in the child's body when the preventive treatments are given to him, we have not established a trend of mind which will prevent the parent from using any number of so-called specifics which are recommended by advertisers in the printed page, and on the air. The recommendation of the promoter of cure-alls is as valid to this man as ours.

Every person here has been confronted with the confusion in the minds of average parents regarding the so-called "shots" which their children have received. Too many of these people believe that diphtheria prevention treatments protect their children against whooping cough and scarlet fever, as well as diphtheria. In our efforts to reduce diphtheria cases and deaths, have we not forgotten that most persons have little information

regarding the specificity of the recommended procedures? We, and I include physicians, assume that this person knows what we are talking about when we say "diphtheria prevention," and 99 per cent of his kind do not.

An intelligent woman stopped me, after a meeting recently, to tell me how disturbed she was because a few days before she had taken her child to a pediatrician for a repeat Schick test and he told her that the test sometimes raised the blood titer. Her concern was that the physician was doing something to her child's blood, and how would it affect him in after years.

Stuart Chase, in his *Tyranny of Words*, which is a tyranny in itself, has advanced the idea that words as they are now understood separate us rather than bring us together, and I believe that this is particularly true in much of the vocabulary used by physicians and many health workers.

Advances in a democracy can be made only on a basis of education. A health dictatorship varies not one bit from a political dictatorship. The public must learn that it is their bodies and minds that are concerned, and that their happiness and security depend upon the care of their bodies. They must learn what intelligent care means, and the advantages and limitations of medical science, if they are to choose wisely. This learning will come only when we have given them an idea of body processes and medical procedures.

Health education in the early days was centered largely upon communicable diseases because they were the immediate problems of health organizations. Health education has played a large part in the control of these diseases, and these same organizations now are turning their attention to other conditions which have supplanted the communicable diseases in the list of principal causes of death.

The education required to affect the

degenerative diseases is much more difficult than the mass education which produced such good results with the communicable diseases, because it involves morbidity as well as mortality, and affects the economic life of the people, as well as their happiness. The prevention and care of the nutritional and degenerative diseases requires skill of diagnosis which involves new procedures which are costly and time consuming, and can be obtained only from a physician.

Without going into the economics of this situation about which the health educator has little to do, the responsibility for supplying education which will prevent these disabilities still is with us. An interpretation of procedures is vital and probably will be to an increasing extent as medical science advances.

Is mass education enough for this? I have doubted it for a long time. I believe we must search diligently for opportunities for personal contact—that face to face presentation which will give us an opportunity to learn what people think and how they interpret the education which we plan for them. A number of discussion groups in any community will provide this way of interpretation which will reach thousands who would not be interested in our printed matter or who never will attend meetings.

Those who lead discussion groups must be aware of the need for a common language or they will only add confusion to an already confused state.

Our printed matter, our radio talks, and our newspaper releases all need careful study in order that the many will see scientific medicine not as an abracadabra but as a reasonable procedure built upon their body needs and operation.

You will listen to discussions of technics for supplying this interpretation to the public during this meeting and

these technics will be adapted to the various communities represented by those who are here because the job for the present rests with them. How can we help the physicians of our communities take on this job which so obviously belongs to them?

It is our frequent error that we plan a program and then ask physicians to promote it for us. We go on the assumption that we know what is good for the people and that the physician will benefit from the program as well as the persons he serves.

Somehow, all persons like to have a hand in shaping "our duty." Physicians are not exceptions to this rule, and we do "our duty" with much more relish if it is palatable and we are sold on it.

Prominent physicians in most communities are asked to assist health organizations in presenting radio material, in giving talks to groups, and in many other activities. But how about the neighborhood physician, the general practitioner, who sees the largest number of the sick and near-sick in any community? What efforts are we making to help him be a part of the health education program? Because he must be available at all hours of the day and night, he has less time to read and to attend medical conferences, and because his income is less than his specialized brethren he has less money to spend for postgraduate education.

Do we keep the general practitioner informed as to our program through frequent and carefully planned communications or do we wait for him to know about it from the newspaper, radio, or his patients?

There probably is no better investment of health education funds to be found than that intelligently planned to keep physicians informed. The personnel of the organization is expanded a hundredfold by each physician who recognizes his part in the field.

Medical societies and organizations send very tiresome and uninteresting communications to physicians whose interest they wish to obtain. The rule with these communications is that they shall be several pages in length, single spaced, with little or no margin, and that the mimeograph will be cleaned after the communication, and never before.

There is not much doubt that we talk about the subject in which we are currently interested. Physicians are not exceptions to this rule. With this in mind, can we not find places for them in our program of interpretation in order that they may learn a language that will be understood by their patients, and that they may delight in watching the appreciation of these patients when they are recognized as intelligent persons.

If we are to elicit the interest of physicians, we must keep them informed as to the problems of our community; we must ask their advice as to solving these problems, and, since written communications are the quickest way to do this, our missives must be attractive from a physical standpoint, and psychologically appealing.

There are many bits of health education which the neighborhood physician can do for small groups. In the early days of our diphtheria prevention program we sought opportunities for the dissenting or uninterested physi-

cians to talk about it. Printed matter was mailed to them giving them the details with which they were not too familiar and they were asked to talk to small groups in churches and in schools about the need for protection against diphtheria. They came through to a man, and reports from patients that the physician did not believe in immunization ceased.

In a county in Michigan, the health officer invites one of the practising physicians of his community to take his place when he is to be out of town for a day or two. The temporary health officer learns many things about health conditions in the county during his brief period of responsibility, and his interpretation of activities becomes excellent health education for his own patients.

SUMMARY

Health education regarding procedures and practices must come from the physician at the time the patient is seen.

Medical terminology must be translated into a language which can be understood by the average man.

Physicians shirk this responsibility largely because in the past it was not expected of them.

The experience of meeting groups and answering their questions will give the physician an appreciation of the confusion found among all classes of people.

The health education activities of an organization will be effective only when local physicians have a hand in planning and helping to promote them.

Use of the Phosphatase Test in the Control of Pasteurization*

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AT the last Annual Meeting of the American Public Health Association, I reported on the use, by the Chicago Board of Health, of the phosphatase test for determining the efficiency of pasteurization of the milk and cream sold in the city. The chief cause of improperly pasteurized milk was reported to be dishonesty on the part of some of the operators of the equipment. I gave a description of the methods used in greatly reducing errors of pasteurization from this cause.

The number of samples of improperly pasteurized milk and cream which were subsequently found was very small. Investigations disclosed that the cause in the majority of these samples resulted from the use of improperly constructed pasteurization apparatus or the use of apparatus so constructed as to permit readily of improper operation, which was particularly true of the inlet and outlet valves with which the pasteurizer vats were equipped. In 88 milk pasteurization plants, 212 outlet valves and 146 inlet valves were defective when compared to the latest standards of the U. S. Public Health Service for the construction and operation of such equipment. The important requirements for plug-type leak-protector

pasteurizer valves may be briefly summarized as follows:

A. All grooves shall be at least $3/16''$ wide and at least $3/32''$ deep, to prevent clogging and promote drainage.

B. All single leak grooves and all mating leak grooves when mated shall extend throughout the entire depth of the seat, so as to divert leakage occurring at all points throughout the depth of the seat, and so as to prevent air binding.

C. Washers or other parts shall not obstruct leak-protector grooves.

D. A stop shall be provided in order to guide the operator in closing the valve so that unpasteurized milk may not inadvertently be permitted to enter the outlet line or the holder, respectively. The stop shall be so designed that the plug will be "irreversible" if the plug is provided with any grooves or their equivalent unless duplicate, diametrically opposite grooves are also provided.

E. All leak-protector valves shall be installed in the proper position to insure the proper functioning of the leak-diverting device.

1. The design shall protect against leakage in every position of the plug which prevents the flow of milk, *i.e.*, every "closed position."

2. In the case of outlet valves, the design shall, in every "closed position," prevent the accumulation of unpasteurized milk in the plug channels.

F. There shall not be more than $5/64''$ between the "just closed" position and the functioning of the leak grooves.

G. Pipe lines between the inlet valve and holder shall be as short as practicable, and shall be sloped to drain.

H. In cases where the milk in the vat is apt to submerge the inlet pipe and thus prevent its complete emptying when the inlet valve is closed, the inlet line shall be pro-

* Read at a Joint Session of the Laboratory, Public Health Engineering, and Food and Nutrition Sections of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

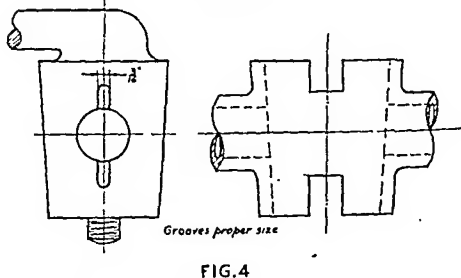
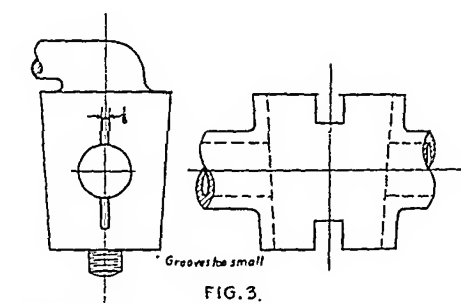
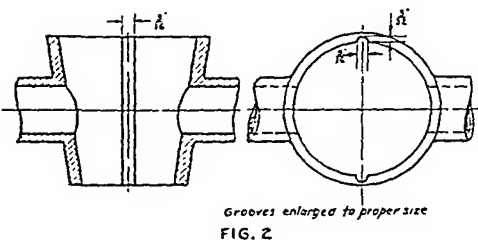
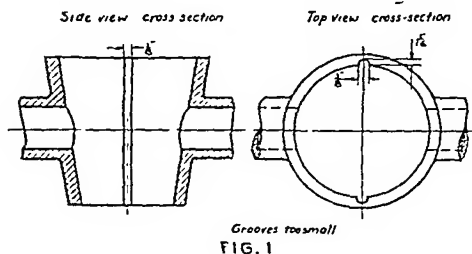
vided with automatic air relief located either at the valve or otherwise, and so designed as to function in every closed position of the valve.

I. Outlet valves on pasteurization holders shall be close-coupled whenever the outlet penetrates the holder below the milk level.

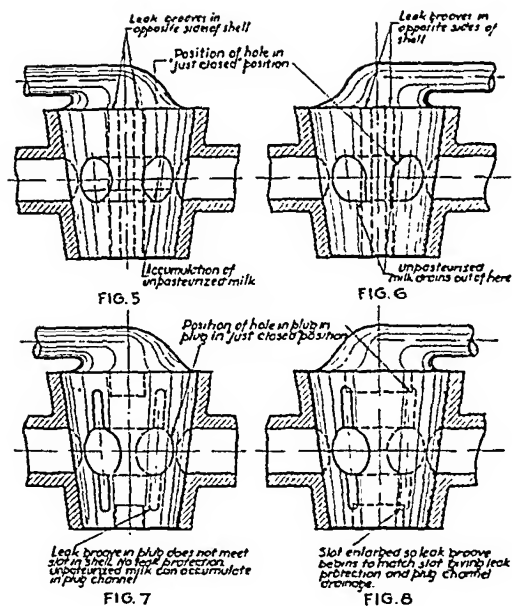
J. Outlet valves shall be operated so that they are fully closed during the filling, heating, and holding periods. Inlet valves shall be operated so that they are fully closed during the holding and emptying periods.

In order to prevent the possibility of improperly pasteurized milk occurring from the use of defective equipment, owners of milk plants in which valve defects were found were advised to make the necessary changes, which they readily agreed to do. In a few instances the changes were made by the individual dairymen, but in the majority the work was done by a mechanic selected by the manufacturer of the valve, and supervised by a representative of the Board of Health. The cost was exceptionally small, although much of it was done in machine shops, and the milk plant operators coöperated wholeheartedly in making the improvements, with the result that all necessary changes were completed.

The most common defect found in the valves, both inlet and outlet types



and regardless of make or design, was that the grooves were too small to function properly. About one-third of these valves had the entire leak groove in the valve body. The defective grooves were corrected by putting the valve body in a shaping machine and cutting the groove to the proper size with a tool sharpened at the end to a semi-circle $3/16'' \times 3/32''$. (Examples of this defect and the method of correction are shown in Figures 1 and 2.) This would require about 45 minutes' work for a single valve. If these were several identical valves, the time per valve would be reduced considerably, since the machine would not have to be reset for the succeeding valves. Where the groove to be enlarged was in the valve plug, a different method was used. The plug was put in the chuck of a lathe. An electric drill was mounted on a sliding tool rest. A $3/16''$ reamer was rounded at the end to form a semi-circle $3/16'' \times 3/32''$ and put in the drill chuck. The drill on the tool rest was moved back and forth, the revolving reamer milling the groove to the proper size. (See Figures 3 and 4.) With this set-up any kind of groove in the plug could be cut or enlarged. A plug



with a pair of grooves, either full or partial length, could be set up in the lathe and milled to the proper size in $\frac{1}{2}$ hour.

Another common defect found in inlet and outlet valves was that the valves did not prevent the accumulation of unpasteurized milk in the plug in all closed positions. In the cases where the grooves were in the valve body only, the plugs were made self-draining in all closed positions by cutting away metal from the plug to form two opposite lower corners of the hole in the plug, so that this cut-away would meet the leak-groove in the just closed position and drain the plug. (See Figures 5 and 6.) In a few cases the center of the hole in the plug would ride past the leak groove in the fully-closed position, making it necessary to cut away metal to create the additional two lower corners to make the plug drain completely in the fully-closed position. This cutting away could be done with a round file in about 20 minutes for each plug. (This is illustrated in Figures 9 and 10.)

Another common fault found was in valves which were of a type having grooves in the plug which started at the

lower and upper points of the hole in the plug on each side, and extended far enough up and down the plug to meet a cut-away section of the valve body. Enlarging these grooves to the proper size also, in many cases, corrected the defect of the plug not being self-draining in all closed positions. When enlarging the grooves did not make the grooves in the plug meet the cut-away notch in the shell soon enough, it was necessary to file the notch larger. (See Figures 7 and 8.) Sometimes the groove in the plug did not extend far enough up or down to meet the notch sufficiently to allow a passage $\frac{3}{16}$ " x $\frac{3}{32}$ ". In these cases the grooves were lengthened as well as deepened and widened. As a rule this type of valve was readily improved because it did not necessitate removing the valve body from the pasteurizer.

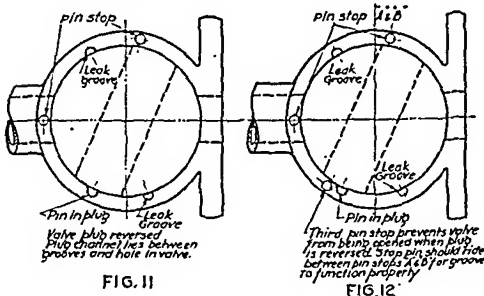
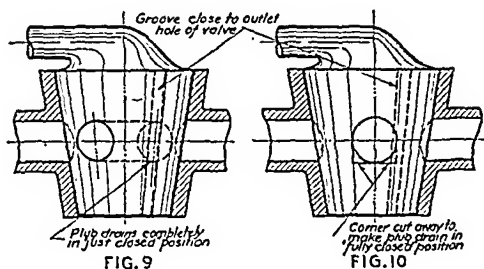
One disadvantage of this style of valve is that it has a short stop-pin in the plug and two pin-stops screwed into the shell. The stop-pin wears readily into the pin-stops, thereby shifting the "fully-closed" position over far enough so that the grooves in the plug do not match fully with the cut-away notches in the valve body. Therefore, a valve which may comply today may not comply in a short time, due to wear. The length of time, of course, for this wear to occur depends on the use the valve receives. Broken or loose pin-stops and stop-pins was a common thing.

The grooves in some valves were located in the shell in such a position that if the plug was not operated in the quadrant within the stop-pins and the plug was in the "just-closed" position, the hole in the plug would be about $\frac{1}{4}$ " from the leak groove, thereby making it possible for the milk to short circuit through the hole in the plug to the outlet line. This defect was overcome by making the plug irreversible by putting another pin-stop in such a position that

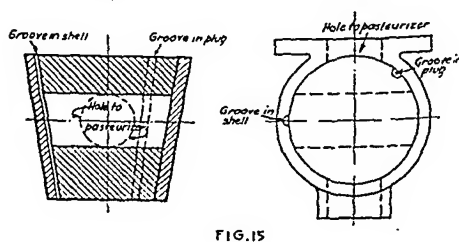
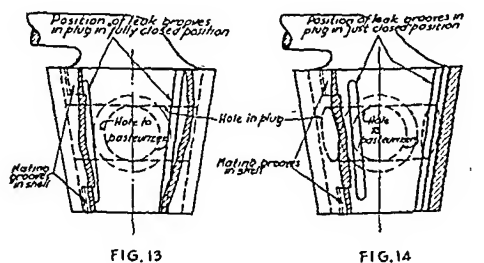
if the plug were reversed it would be impossible to open the valve. (See Figures 11 and 12.)

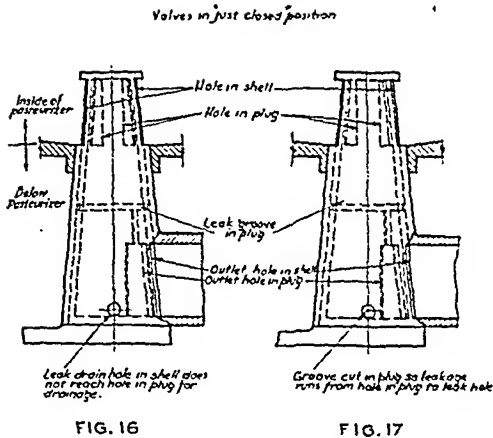
A few irreversible outlet valves had the leak grooves located in the plugs in such a position that they were between the hole in the plug and the outlet hole in the pasteurizer in the "fully-closed" position, the mating grooves being in the valve body. This design would prevent the accumulation of unpasteurized milk in the plug when in the "fully-closed" position, as shown in Figure 13, but when in the "just-closed" position, the one leak groove lies in the opening of the pasteurizer and does not function, making it possible for unpasteurized milk to accumulate in the plug or leak into the outlet line. (This is illustrated in Figure 14.) This defect was overcome by extending the groove, which does not pass the outlet hole of the pasteurizer, the full length of the plug to the proper size, and filling the other groove with tin or brass. A new groove was cut in the shell, the distance from the outlet hole of the pasteurizer being equal to the size of the diameter of the hole in the plug, and a corner of the hole in the plug was filed away to make it self-draining in all "closed-positions" (see Figure 15). When this same defect occurred in a reversible valve, both grooves in the plug were filled and new ones cut in the shell. Valves with four grooves in the plug and mating grooves in the shell were modified in the same manner. In the case of inlet valves it was necessary to fill both grooves in the plug because enlarging the one groove to the proper size would bring it too close to the hole in the plug and to the outlet hole to the pasteurizer. To remodel a valve which requires the filling of two grooves, cutting two new grooves, making the plug self-draining in all closed positions and installing a pin-stop and stop-pins, requires about $2\frac{1}{2}$ hrs. in the shop.

Another type of valve has a hollow



plug which is inserted through the bottom of the pasteurizer, with two small holes that match with two holes in the shell inside the pasteurizer and one large hole that matches with a large hole in the shell below the pasteurizer and the outlet pipe in the open position. The leak groove runs horizontally around the plug or shell between the upper two inlet holes and the lower outlet hole diverts the leakage to the lower chamber of the plug and then out of a leak hole in the shell to the





floor. This leak hole was not always located in such a position as to drain the plug in all closed positions, as illustrated in Figure 16, so it was necessary to extend this hole to meet the hole in the plug in the "just-closed" position, or to file a groove in the plug. (See Figure 17.)

Another defect noted in this valve which classifies it as not completely leak-proof, was the fact that through usage the plug may be scratched or a flat side develop due to much handling. When this scratch or flat side occurs on the side of the plug that lies in the outlet of the valve in the closed position, leakage will run down this scratch or channel into the outlet line, rather than around the horizontal groove into the lower chamber and out the leak hole. These valves were made self-draining in all closed positions to prevent an accumulation of unpasteurized milk in the plug, but, in addition, the outlet pipes are required to be disconnected during the filling, heating, and holding periods. It is then steamed just before being opened.

Very few inlet valves had air vents or vacuum breakers, so, as a precaution, air-vent grooves were put in the plugs of all inlet valves on the pasteurizer side which would be operative in all closed positions.

Most outlet valves had stop-pins and pin-stops, but about 25 per cent of the

inlet valves had to be equipped with them. This was an easy matter. Holes were drilled and tapped, pins threaded and screwed in. Threaded pins were found to be more permanent than sweated or driven ones. Practically all bottom plates afforded ample drainage and defective ones were readily improved.

From the work done on these valves, we found that the vertical leak groove was most desirable. A horizontal groove is satisfactory only when leakage occurs in a vertical direction, as in a flow-diversion valve.

Due to the ease with which stop-pins can be broken or abused, we found the most desirable arrangement by having the shell cut away on one side, thereby eliminating two pins. This also makes the valve irreversible.

Inlet valves should be self-draining in all closed positions because, with an accumulation of raw milk in the plug, it is possible for this milk to leak into the inlet line leading to the pasteurizer through a deep scratch such as may be caused by turning the valve with a piece of abrasive substance in it.

The result of this equipment improvement program has been a definite decrease in the number of samples of milk found, which the phosphatase test indicates not to have been properly pasteurized.

SUMMARY AND CONCLUSIONS

The phosphatase test, when originally applied, showed a relatively large proportion of samples of milk and cream to be improperly pasteurized, due principally to improper construction and operation of pasteurization equipment. An intelligent study by the health officer of the reasons for pasteurization failure makes it possible for him to insure the use of proper pasteurization equipment and methods to the end that errors may be very nearly eliminated.

Application of the Phosphatase Test to Creamery Butter*

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ACCURATE control of the temperature and the time of heating in the pasteurization for dairy products is essential to good public health practice. Formerly the only proof of an adequate treatment was the chart of the recording thermometer. This in turn depended not only upon the integrity of the operator, but also upon the accuracy of the instrument itself. Therefore, the development of a dependable laboratory test to indicate the thoroughness of pasteurization has been widely welcomed and to date the phosphatase test appears to have the most promise as an effective laboratory method for the control of proper pasteurization.

The original phosphatase test was developed by H. D. Kay and W. R. Graham in England in 1935.¹ These workers found that a phenol value of 2.3 Lovibond blue units or less produced in a sample of milk treated with buffered substrate and incubated for 24 hours at 37° C. would be indicative of properly pasteurized milk which had been heated to 145° F. and maintained at that temperature for 30 minutes. Kay and Neave² later reported that for the American conditions of pasteurization at 142° F. for 30 minutes, a 2½

hour incubation was sufficient. Data collected by Storrs and Burgwald³ in their studies of the phosphatase test under commercial conditions indicated that 2.3 Lovibond blue units as reported by Kay and Graham for samples incubated 2½ hours constitutes a proper standard for milk pasteurized at 143° F. for 30 minutes.

These standards which have been developed for the holding methods of pasteurization are not practical to apply to creamery butter practice inasmuch as the vast majority of creameries in this country use the flash method of pasteurization due primarily to volume considerations. Last year Parker and Brengman⁴ reported that for cream pasteurized under a variety of commercial conditions of "flash" pasteurization, a temperature of at least 185° F. for 2 to 3 seconds is necessary in order to obtain a maximum reduction of bacteria as determined by the plate method. Incidentally in their studies, a preheating period of 30 seconds was used to raise the temperature from approximately 100° F. to the pasteurizing temperature. Pasteurizing temperatures below 185° F. were found to be not as effective as temperatures of 185° F. or higher. The conditions of high-temperature short-hold pasteurization of 160° F. for 15 seconds has never been studied in the pasteurization of

* Read at a Joint Session of the Laboratory, Public Health Engineering, and Food and Nutrition Sections of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

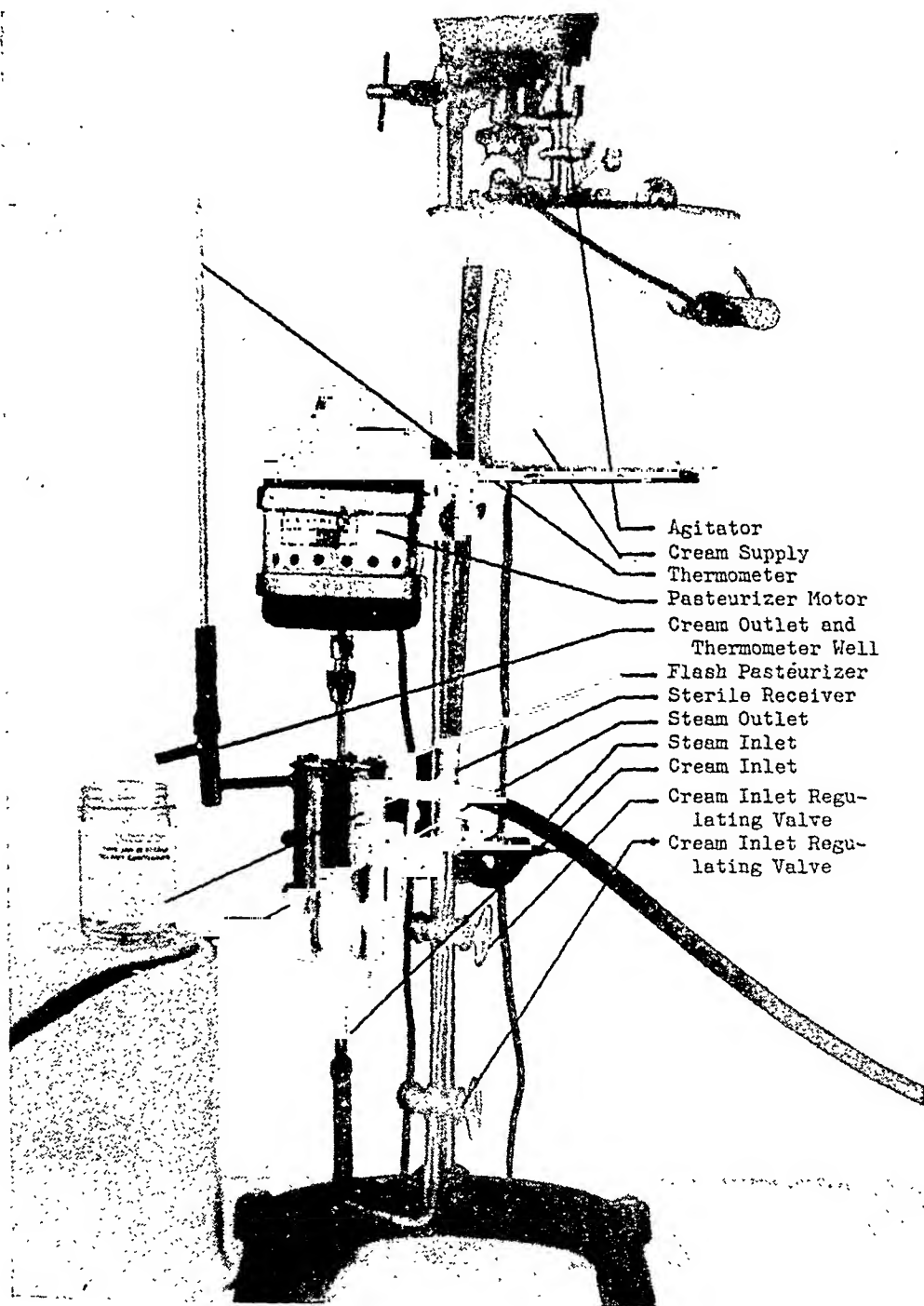


FIGURE I

cream for butter making. Therefore, our studies have centered upon the establishment of standards for the phosphatase test which are applicable to cream for butter making which has been heat treated by "flash" pasteurization.

Our first problem was to duplicate, on a laboratory scale, the practical conditions prevailing in the so-called "flash pasteurizer" found in so many commercial creameries. We finally devised a miniature "flash pasteurizer" with which it is possible to control the time

required to bring the cream to the pasteurizing temperature.

Before making any experimental studies with this laboratory pasteurizer, the entire assembly was first carefully cleaned and then sterilized under steam pressure, to preclude the possibilities of any outside contaminating influences. After such preliminary precautions, the apparatus was set in motion to heat successive portions of the same raw cream (previously neutralized) to a series of different temperatures, starting with the highest temperature to be studied as the first in any series. When the temperature and time conditions were properly regulated the laboratory equipment was operated for 5 minutes at the highest temperature to be studied before any samples were taken. Inasmuch as the capacity of our laboratory flash pasteurizer was operated at the rate of 60 cc. per minute (1 cc. per second), we found it convenient to take small samples for our studies of bacterial destruction. Incidentally, in all experiments outlined, 30 seconds were required to heat the cream from approximately 100° F., to the various temperatures studied. In taking the bacteriological samples, 2 or 3 cc. constituted our sample, which was taken at the outlet. Inasmuch as the samples were taken at the outlet, no appreciable holding period was involved, for the instant the heated cream left the outlet and came in contact with the glass side of the sample jar, the cream was pre-cooled, inasmuch as the sample jar was thus collected (generally 2 to 3 cc. in as many seconds), 1 cc. of the sample was immediately transferred to a sterile water blank for dilution purposes, which provided further cooling, as the sterile water was also at room temperature (70° F.). The combined operations of sampling and preparing a dilution of the sample consumed from 10 to 15 seconds.

When the cream pasteurized at the

highest temperature had thus been sampled, the pasteurizer was adjusted to operate at the next lower temperature and then, after an additional minute's operation (to permit the thorough flushing of any hotter cream), the next sample was taken, repeating the process until the series being studied was completed. This raw cream was then sampled and all samples were plated immediately—within 30 to 45 minutes of the time the experiment was started.

In our preliminary work we made studies upon the destruction of bacteria in six different experiments upon six different batches of raw neutralized cream. We examined the samples for the standard plate count, using standard nutrient agar, and for yeast and mold colonies, using potato dextrose agar. The temperatures studied were 165°, 170°, 175°, 180°, 185°, 190°, and 195° F. In only two of the six experiments did yeasts and molds survive pasteurization, and in both instances only at 165° F. The pasteurization efficiencies in all six ex-

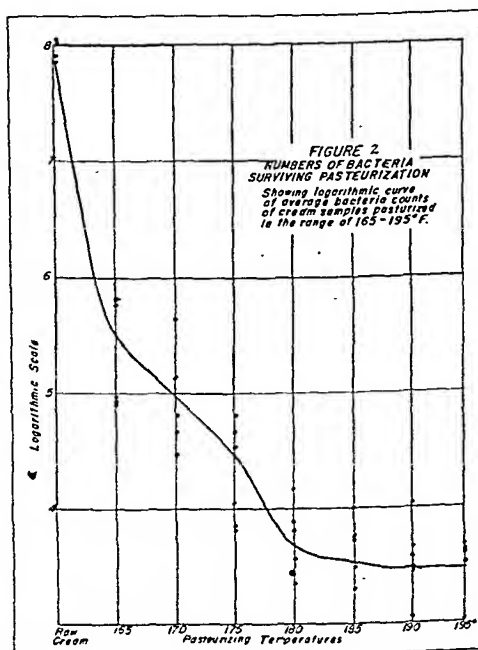


TABLE I
Cream "Flashed" at Different Temperatures

Pasteurizing Temperature Degrees F.	Yeasts and Molds	Coliform Bacteria	Standard Plate Count	Short Method	Lovibond Blue Units		
					2½ Hrs.	8 Hrs.	24 Hrs.
Raw, neutralized	244,000	880,000	8,500,000	pos	10	10	10
160	56	450	40,000	pos.	6.0	7.2	8.6
170	—	—	5,000	pos.	5.0	6.4	7.6
175	—	—	4,700	doubtful	3.0	3.0	3.1
180	—	—	350	neg.	2.1	2.0	2.6
185	—	—	150	neg.	1.9	2.0	2.3
190	—	—	60	neg.	1.6	2.0	2.3
Blank					—	—	0.7

(—) denotes less than 1 per cc. in microbiological examinations

periments exceeded 99 per cent as measured by the standard plate count for all the temperatures studied.

In order to give you a picture of what the bacterial survivals were, we have compiled a curve in Figure 2, representing the logarithms of the average counts for each temperature, while the logarithms of the actual counts themselves are plotted. It was necessary to use the logarithms in order to illustrate adequately the bacterial survivals. In referring to the graph, it is obvious from the slope of the curve that considerable differences in the survival of bacteria were obtained in comparing 165°, 170°, 175°, and 180° F., with each other. Above 180° F., and particularly above 185° F., it is obvious that the differences in bacterial survival became less marked; in fact, the average standard plate counts of the different creams pasteurized at 180°, 185°, 190°, and 195° F., averaged 3,000, 2,330, 2,000, and 2,000 per cc. respectively.

In another series of studies, we have applied to cream samples "flash" pasteurized at 160°, 170°, 175°, 180°, 185°, and 190° F., a slightly modified form of the short method of Scharer and the 2½, 8, and 24 hour incubation technics of Kay and Graham using the Lovibond tintometer for measuring the color production by indophenol. In

Table I are given these data as well as the yeast and mold counts obtained with 5 days' incubation at 21° C. using potato dextrose agar, the coliform bacteria counts obtained in 18–24 hours at 37° C. using violet red bile agar and the standard plate counts obtained with 48 hours' incubation at 31½° C. of the differently treated samples. Incidentally, in these experiments a period of approximately 30 seconds was used in bringing the temperature of the cream from approximately 90° F. to the "flashing" temperatures studied. The heated samples were maintained at the different temperatures for a period of 2 to 3 seconds and then cooled as rapidly as possible in a film similar to that condition encountered in the surface cooling of milk by cabinet coolers. As soon as the samples were cooled, they were plated for the different microbiological examinations, following which they were prepared for the different phosphatase tests as outlined. Sour cream which previously had been adjusted to an acidity of 0.23 per cent (as lactic acid) was used for this experiment. All equipment used in these cream studies was previously sterilized by autoclaving at 15 lbs. pressure for 30 minutes.

The data given in Table I are generally representative of the results obtained in similar experiments. We are

listing in Table II the range of the results obtained in applying the phosphatase tests to cream samples "flashed" pasteurized at the temperatures indicated. Such results were obtained from at least nine experimental trials as described above.

temperatures were maintained within the range of 181° F. to 183° F. we found the mixed cream constituting the complete run which had been so pasteurized, gave a negative reaction by the short method and phenol values of 2.2 Lovibond blue units for the 2½, 8,

TABLE II

Normal Range of Results Obtained in Applying Phosphatase Tests to Cream "Flashed" at 175, 180, and 185° F.

<i>"Flashing"</i> Temperatures Degrees F.	Short Method	Lovibond Blue Units		
		2½ Hrs.	8 Hrs.	24 Hrs.
175	Doubtful to Negative	3.0-3.2	2.9-3.0	3.0-3.1
180	Negative	2.1-2.3	2.0-2.2	2.6-2.9
185	Negative	1.9-2.3	2.0-2.1	2.3

From the data in Tables I and II it is evident that "flash" pasteurization at 185° F. for 2 to 3 seconds is adequate as indicated by the production of less than 2.3 Lovibond blue units in samples incubated 2½ hours or 8 hours and not more than 2.3 units in 24 hours.

In actual plant practice we have had the experience that cream presumably "flashed" at 180° F. gave a positive phosphatase reaction by the short method and Lovibond blue units of 4.4 at 2½ hours and 7.2 units at 8 hours. In checking the plant performance we discovered that the recording thermometer chart showed that the pasteurizing temperature of the cream had fallen below 180° F. for 2 or 3 minutes during the continuous operation. The record showed the lowest point to be 177° F. Although we found the instrument to check accurately with a certified thermometer, the possibility that the pasteurizing temperature may actually have fallen below 177° F. cannot be successfully eliminated inasmuch as the instrument involved did not exercise maximum sensitivity under the conditions of operation prevailing at that time. Later in subsequent trials in which the

and 24 hours incubation periods. These lower phenol values in the commercial samples are doubtlessly due to the fact that the "flashing" temperatures of 181°-183° F. were maintained for approximately 15 seconds. Repeated plant trials where temperatures of 185° F. or higher were used have consistently given similar results. In fact, where positive results have been obtained upon samples of cream by any of the methods mentioned we have found without exception that the pasteurization practice has been inadequate, due to faulty thermometers, the leaking of raw cream into the pasteurized cream or some similar defect.

In applying the short method to cream samples we have found the use of amyl alcohol an indispensable aid inasmuch as the failure to use the same markedly impairs the sensitivity of the test. We have also had the experience that doubtful or even negative interpretations have been applied which gave positive results when the blue color otherwise obscured was extracted by the addition of the alcohol.

In view of the fact that extensive use of butter cultures is made in an effort to impart or develop characteristic

flavor and aroma, we have made some studies of such cultures or starters to determine how they might influence the phosphatase test applied either directly or to cream inoculated with the same. On all samples of starters made from milk pasteurized at 180° F. for 1 hour, and irrespective of the acidity to which the culture was ripened, we have never obtained a positive test by the short method. The highest phenol value we have ever obtained on butter cultures prepared from milk pasteurized at 180° F. for 1 hour was 2.1 Lovibond blue units after 24 hours' incubation.

We have made some studies on cream "flash" pasteurized in the laboratory and also under commercial conditions. A quantity of cream "flashed" at 183° F. under commercial conditions and maintained at this temperature for approximately 15 seconds gave a negative reaction by the short method and phenol values of 2.2 Lovibond blue units with the 2½, 8, and 24 hour

incubations. The butter churned from such cream gave a negative reaction with the short method and phenol values of 1.6, 1.7, and 1.7 for the 2½, 8, and 24 hour incubation periods respectively. Inasmuch as this work was confined to only one trial further study of this point is necessary.

We have, however, made some laboratory studies upon the butter made directly from cream "flashed" at different temperatures similar to methods outlined in the cream experiments discussed above. The results of two of our experiments are shown in Table III.

The data in Table III tended to give further confirmation to the adequacy of 185° F. or higher as the proper temperature of "flashing" cream for creamery butter making. However, further work on the proper amount of butter serum to use is contemplated.

We have applied the short method to water supplies used for washing butter and also to butter salt with negative

TABLE III

Results Obtained in Applying Microbiological Examinations and Phosphatase Tests to Butter Samples Churned from Adjusted Sour Cream "Flashed" at Different Temperatures

<i>"Flashing" Temperatures</i>	<i>Yeasts and Molds</i>	<i>Coliform Bacteria</i>	<i>Standard Plate Count</i>	<i>Kay & Graham Lovibond Blue Units 8 Hrs. Over 10</i>
Butter from:				
Raw neut. cream	621,000	54,000	14,500,000	
Degrees F.				
170	—	—	5,600	4.0
175	—	—	900	3.2
180	—	—	280	2.4
185	—	—	30	1.6
190	—	—	30	1.6
195	—	—	120	1.6
200	—	—	40	1.6
Raw neut. cream	50,000	565,000	5,500,000	Over 10
170	55	120	5,000	Over 10
175	2	10	1,200	7.8
180	—	—	100	2.6
185	—	—	50	1.6
190	—	—	50	1.6
195	—	—	50	1.6
200	—	—	10	1.6

(—) denotes less than 1 per gram

results. The same was found to apply to both lime and soda neutralizers used for adjusting the acidity of sour cream. Chlorine solutions containing not more than 50 p.p.m. also gave negative results—in fact, the greatest phenol value obtained with 24 hours' incubation was 1.2 Lovibond units. All such samples tested were obtained from creameries operating in the States of Illinois, Indiana, Iowa, Missouri, Kansas, and Oklahoma.

We have had the experience that samples of butter giving a negative reaction with the short test when fresh would give a doubtful or a positive reaction after being held 8 days at 70° F. for the keeping quality test. In fact, over 90 per cent of our samples which entered the keeping quality test as negative have given a positive reaction upon completion of the keeping quality test. That phenol production in such samples might be attributed to bacterial activity appears to be indicated by the facts that, (1) sera from fresh butter samples which originally gave a negative reaction still give a negative result when two drops of chloroform per 0.5 cc. of serum was added and held for 8 days at 70° F. while the same sera to which no chloroform was added gave a positive reaction under similar conditions of holding, and (2) the same sera held 8 days at 42° F. without the addition of chloroform gave negative results for indophenol by the short method. Whereas butter is normally 30 days old before it reaches the consumer and, during the interim between its manufacture and its consumption, is subjected to a variety of temperature changes, it is desirable that more be known concerning its history before a positive phosphatase reaction can be definitely attributed to improper pasteurization of the cream from which the butter was made. Incidentally, we have had the experience of having butter which gave

a negative phosphatase reaction by the short method develop a definitely positive reaction after overnight storage in a refrigerator where a motor used for circulating brine developed a short circuit and, due to fuse failure to break the circuit, burnt the armature windings and charred the wooden wedges. The smoke which developed contaminated some of the exposed surfaces of butter which then gave a positive reaction. We are now investigating the possibility of similar reactions of butter stored under refrigeration with smoked meats or meats impregnated with smoked salt.

A chlorinated surface water supply in which the possibility of slight phenol production due to the oxidation of algae-growth giving to butter washed with the same a positive phosphatase test even though the cream used in its production is apparently adequately pasteurized, has just recently come to our attention. Unfortunately, we are unable at this time to give any definite information.

These different experiences and results obtained with the phosphatase test demonstrate clearly the desirability—in fact, the necessity of making check determinations for indophenol in order to preclude pseudo-phosphatase reactions.

We have used both the Kay and Graham reagents and methods in many of our determinations. The usual precautions of fresh reagents and clean glassware which had been washed with phenol-free detergents and then thoroughly dried before use have been meticulously observed. In using the short method of Harry Scharer,⁵ we have made certain modifications which appear to give us better end points with which we have been able to determine more accurately a positive or a negative result. We have increased the incubation time from 10 minutes at 100° F. to 15 minutes at 105° F. This added

time and temperature appears to give a better agreement when compared with the longer methods of Kay and Graham.¹ The addition of amyl alcohol apparently gives a better extraction of color with less difficulty of forming an emulsion which will not allow the color to rise to the surface of the sample.

In preparation of our butter samples we melt butter in a water bath at 45° C. for 20 minutes, allowing the sera to settle to the bottom of the conical centrifuge tube. A clean pipette is then used to withdraw 0.5 cc. of the sera and then transferred to the test tubes containing 5 cc. of the buffered substrate solution.

SUMMARY OF RESULTS

1. Our experiments upon sour cream adjusted to conventional churning acidities and "flashed" at different temperatures have indicated that 185° F. or higher will give negative phosphatase reactions upon samples treated by a modification of the Scharer short method as well as by the Kay and Graham 24 hour incubation method.

"Flashing" cream at 180° F., however, gave negative results by the modified Scharer short method as well as by the 2½ hour and 8 hour incubation methods of Kay and Graham, although doubtful results were obtained by using the 24 hour incubation period.

Cream "flashed" at 175° F. gave doubtful results by the modified Scharer short method and positive results with the Kay and Graham

methods whereas "flashing" below 175° F. gave positive results with all methods.

2. Butter freshly made from sour cream of adjusted acidity which had been "flashed" at 185° F. or higher gave negative phosphatase tests when using the modified Scharer short method and the Kay and Graham 24 hour technic.

3. Some indications of possible phenol production by bacterial activity in butter samples subjected to the keeping quality test of holding at 70° F. for 8 days (100 per cent humidity) have been observed.

4. Due to factors which may stimulate phenol production in butter subjected to normal changes in temperatures and environment during the interim between its manufacture and consumption, caution should be exercised in interpreting a positive phosphatase test as indicative of the inadequate pasteurization of the cream used in its manufacture.

5. Further work should be done to establish the equitable amount of sample of butter serum to be used to interpret its relation to the original cream from which the butter was made.

REFERENCES

1. Kay, H. D., and Graham, W. R. *J. Dairy Res.*, 6:191-203, 1935.
2. Kay, H. D., and Neave, F. K. *Dairy Industries*, Jan., 1937.
3. Storrs, Arnold B., and Burgwald, L. H. *J. Milk Tech.*, Jan., 1938, pp. 1, 2, 18-35.
4. Parker, M. E., and Brengman, F. C. *Proc. Am. Butter Inst.*, 1937.
5. Scharer, Harry. *J. Dairy Sci.*, XXI, 21 (Jan.), 1938.

The New Appraisal Form for Local Health Work*

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IT is indeed a pleasure to present the *Appraisal Form for Local Health Work* to the International Society of Medical Health Officers. Since 1924, when the first generally accepted schedule for appraising public health services was developed by Rankin, Crumbine, and others, the health officers of the country have been its severest but most constructive critics and therefore its strongest friends. They have contributed to its success and sound development by making available their personal experience and the collected records of their departments at times of revision. They have been quick to recognize advantages and equally quick to recognize and speak frankly of inconsistencies and shortcomings.

It has been my extreme good fortune to have the privilege of participating both in the development of the original tentative schedule in 1924 and the subsequent revisions, including the present one. Those of you who have sat around the discussion table when revisions were in progress will, I am sure, agree that those occasions are practically a complete course in public health administration. To have present-day health practice in the various fields

of public health service discussed by such people as Winslow, Chapin, Godfrey, Freeman, Ruhland, Waller, Leathers, Whitaker, Bishop, Fleming, and Sippy, is stimulating. It is invaluable, however, in developing a practical measuring rod for public health services, to have the discussion of these practices which comes by letter, by personal contact, and otherwise from city and county health officers all over the country as they use the various editions, or attempt to apply them to their own programs.

In keeping with the Association's policy over the years, of seeking the aid of health officers in the field in the revisions of the *Appraisal Form*, the specific advice of about 50 health officers who had used the Form was sought with regard to a half dozen questions of policy in this revision. The opinion of this group was that:

1. The *Appraisal Form* should be a convenient guide to health workers in the development of a program.
2. The standards set up should represent the optimum range of practice throughout the country.
3. The revised Form should not be less inclusive than its predecessors.
4. With all its faults, score was an essential element if the Form were to continue to be as useful as all testified it had been.

With these general sailing orders, the committee set to work with the

* Read before the International Society of Medical Health Officers in Kansas City, Mo., October 24, 1938.

others came varied criticisms which were also used to guide the committee. Among the chief of these were:

1. The Form did not fit every community.
2. It gave score on services that were not needed.
3. It was too long and complicated.
4. It presupposed a standard program.
5. It penalized a small staff.
6. It presumed that the health officer had intimate knowledge of medical practice in his community.

COMBINATION OF URBAN AND RURAL FORMS

It will be recalled that the *Appraisal Form* was first developed for urban areas and after 3 years' experience a rural schedule was set up to take into

consideration the differences in the development of health service in cities and counties. In this revision, a committee was well along in its work on the *Rural Form* when it was found that 94 per cent of the items which had been tentatively selected for the revised edition would apply equally well to urban areas. After careful consideration of the implications of this step, the two committees were merged and a single Form applicable to both urban and rural local health services was developed.

Throughout the years there has been one guiding principle which the committee has kept continuously in mind,

FIGURE II

8. Diphtheria Control

a. Contacts examined by a health department diagnostician at time of epidemiological investigation and time of release and cultures made of suspected cases

2

b. Cases and contacts released after 12 days or two successive negative cultures

1

NOTE: Where diphtheria shows a zero incidence, items a and b should be omitted from consideration in appraising.

c. Immunization of children under 5 years of age

10

10

Standard: 60 per cent of population under 5 years of age known to have received immunizing agent against diphtheria

Percentage — 60 plus . . . 10 points

50-59.9 . . . 9

40-49.9 . . . 8

30-39.9 . . . 6

20-29.9 . . . 4

10-19.9 . . . 2

Less than 10 . . . 0

Children protected ÷ population under 5 X100 =
percentage under 5 protected

Value of Item	Item for Scoring	Value Assigned			Total
		HD	OOA	VA	
2					
1					
10	10				

FIGURE III

28. Obstetrical Service—continued

b. Nursing service at time of delivery (interpreted to mean registration of mothers with and regularly visited by nurses for not less than 3 months before delivery as well as at time of delivery)

Standard: Number of cases registered at least 3 months before delivery equal to 25 per cent of births occurring in the home

Percentage — 25 plus . . .	10 points
23–24.9 . . .	9
21–22.9 . . .	8
19–20.9 . . .	7
17–18.9 . . .	6
15–16.9 . . .	5
13–14.9 . . .	4
11–12.9 . . .	3
9–10.9 . . .	2
5– 8.9 . . .	1
Less than 5 . . .	0

Cases registered ÷ births occurring at home X100 = percentage of home deliveries supervised.

NOTE: In areas where the number of home deliveries is less than 100, this item may be omitted from consideration in appraising.

Value of Item	Item for Scoring	Value Assigned			
		HD	OOA	VA	Total
10					

namely, that all parts of the public health program must be considered from the viewpoint of the administrator—the health officer—rather than from the point of view of the specialist, such as a director of a particular service, and, though the committee has continuously sought the advice and assistance of the special groups—laboratory, sanitation, vital statistics, epidemiology, child hygiene—it has tried to maintain a proper balance of emphasis which at times has not been easy.

THE NEW FORM

The present Form consists of three main parts. Part I, General Information, has been greatly enlarged in this

issue to provide a place for recording pertinent facts in some detail regarding administrative organization of health services, finances, economic status, the racial and age distribution of population, vital statistics relating to births and to deaths from certain causes, hospital and medical facilities, public health personnel.

Part II, is a detailed schedule for surveying and appraising selected health activities which are believed to be indicative of the community service.

In Part III, Selected Health Indices, the most objective and significant items from sections I and II are brought together for easy review.

To give a better idea of material

contained in these sections, I should like to present a few specimen items. From Part I, I have selected the table showing hospital facilities (1) and medical personnel (2) (see Figure I), as illustrative of the type of information which one should have about a community as a preliminary to appraising its health services.

I must present a number of sample sections from Part II in order to illustrate the various types of change made in this revision.

VARIABLE BASE

Figure II illustrates the most far reaching change which has been made in the *Appraisal Form*, namely, the variable base for scoring. To avoid the obvious error, which has been frequently criticised in the past, of making a service a requirement where no service is necessary because of the nature of the problem, scoring in this edition is on a variable base. The first two items under diphtheria control shown in this table clearly cannot be carried out unless diphtheria is present and these items, as the note indicates, may be omitted from scoring in an area where no diphtheria is present in the year under consideration. The third item, however, I am sure you will all agree, is at present universally applicable and all communities may well be rated on the percentage of the population under 5 years who have been immunized.

In Figure III, a similar example of this principle in another field is shown in obstetrical nursing service. Here the determination of whether the service should be scored on or not in a particular area depends upon the demand for this type of service, it being the opinion of the committee and its consultants that unless there are 100 women delivered at home each year it is questionable whether such a service can be economically offered by a health

department. This item also illustrates another point, namely, that the *Appraisal Form* is attempting to keep pace with changing practices in public health work. The percentage of the deliveries for which nursing assistance is expected has been raised from 5 to 25.

Figure IV illustrates a different kind of variability and is drawn from the section on water supply. Here the item with the dagger applies only to rural areas and is omitted from consideration when the Form is applied to cities, and items c and d, dealing with industrial water supplies, are taken into consideration only in urban areas. Item a, which is not shown, rates the percentage of urban population served with a public water supply.

Such changes as these make the Form much more specific for the community under consideration and while it throws out any possibility of direct comparison of scores between communities, it does not vitiate comparison of scores of the same community from year to year as the variation in scoring base is simply a reflection of the changing health problems.

QUALITATIVE CRITERIA

Probably the criticism of the Form most frequently made was that it did not give sufficient consideration to the quality of service rendered but scored entirely upon quantity performance. The committee has sought to include qualitative standards wherever possible. One difficulty confronted in this attempt was that there are so few fields in which acceptable standards of quality have been developed. Another point which must be borne in mind is that though services are expressed in quantitative terms, the summation of these may truly reflect the quality.

As examples of such changes, may I cite the criteria set up for judging the typhoid fever control services as shown

FIGURE IV

42. Water Supply

b. Rural population provided with satisfactory water supply

8†

8†

Standard: 50 per cent of rural population provided

Percentage—50 plus 8 points

45-49.9 7

40-44.9 6

35-39.9 5

30-34.9 4

25-29.9 2

20-24.9 1

Less than 20 0

Percentage—Sub-total b—column 6

c. Health department has knowledge of all industrial plants using city supply for emergency purposes

2*

2*

d. Emergency services approved by state department of health

8*

8*

Standard: 100 per cent approved

Percentage — 100 8 points

95-99.9 6

90-94.9 5

85-89.9 3

80-84.9 2

75-79.9 1

Less than 75 0

Emergency services approved

÷ total emergency services

X100 = percentage approved

* For cities only.

† For rural only.

in Figure V. The first three of these are definitely indications of quality of the service. To be sure in appraising an area, one must be certain that the practice is consistent in the handling of all cases. This may mean spending time in the field with the individual who is responsible for this activity.

Figure VI is an example of the inclusion in the *Appraisal Form* of definite standards which have already been set up by recognized leaders. In

this instance the criterion of minimum satisfactory treatment of syphilis as established by the Coöperative Clinical Group is incorporated as a scoring item.

The criteria set up for judging institutional care of tuberculous cases are examples of the possibility of judging quality through the application of quantitative criteria. These criteria are shown in Figure VII. Early editions of the Form were content to judge the adequacy of institutional

FIGURE V

9. Typhoid Fever Control

	<i>Value of Item</i>	<i>Item for Scoring</i>	<i>Value Assigned</i>			
			<i>HD</i>	<i>OOA</i>	<i>VA</i>	<i>Total</i>
a. Routine practice to secure stool and urine cultures of contacts at time of epidemiological investigation . . .	3					
b. Routine practice to require negative stool and urine cultures at least 1 week apart and when patient is clinically recovered before cases are released from observation	3					
c. Agreement with health department signed by all known carriers regarding occupation and health habits . .	2					
d. Typhoid vaccine freely available . . .	1					

NOTE: Where typhoid fever shows a zero incidence items a, b, c, d, should be omitted from consideration in appraising.

FIGURE VI

18. Treatment of Cases—continued

	<i>Value of Item</i>	<i>Item for Scoring</i>	<i>Value Assigned</i>			
			<i>HD</i>	<i>OOA</i>	<i>VA</i>	<i>Total</i>
e. Treatment of syphilis cases under treatment at clinic on January 1 last year	4	4				
Standard: 60 per cent having had 20 arsphenamine and 20 heavy metals						
Percentage — 60 plus 4 points						
50-59.9 3						
40-49.9 2						
30-39.9 1						
Less than 30 0						
Cases having 20/20 ÷ cases under treatment, a year ago						
X100 = percentage adequately treated						

care of tuberculosis simply on the number of patient days per death. Each revision has added to this, first emphasizing minimal cases, and, in this revision, attention is also directed to the use of collapse therapy, the prompt hospitalization of cases, and the continuity of treatment.

The organized medical service for maternity supervision is judged by the percentage of total cases under super-

vision and, as shown in Figure VIII, the average number of visits per case, the extent to which Wassermanns are made as a routine procedure, and the treatment of women with positive reactions. While there are other items that might equally well be selected as criteria of quality in this field, services meeting these requirements will almost without exception be carrying on a good program.

FIGURE VII

25. Institutional Care

	Value of Item	Item for Scoring	Value Assigned			
			HD	OOA	VA	Total
a. Hospital patient days ¹	10	10				
Standard: 150 patient days per death						
Patient days—150 plus . . . 10 points						
125-149 . . . 7						
100-124 . . . 4						
75- 99 . . . 1						
Less than 75 . . . 0						
Patient days ÷ deaths ==						
..... patient days per death						
b. Minimal cases hospitalized	3	3				
Standard: 15 per cent of total hospital						
admissions in minimal stage						
Percentage — 15 plus . . . 3 points						
12-14.9 . . . 2						
10-11.9 . . . 1						
Less than 10 . . . 0						
Minimal cases admitted ÷						
total admissions X100 ==						
..... percentage minimal						
c. Cases hospitalized within 2 months of						
report	2	2				
Standard: 60 per cent of cases hospi-						
talized						
Percentage — 60 plus . . . 2 points						
40-59.9 . . . 1						
Less than 40 . . . 0						
Cases hospitalized within 2 months						
..... ÷ cases hospitalized						
X100 = percentage hospi-						
talized within 2 months						
d. Facilities available for initiation of col-						
lapse therapy and supervision of cases	5	5				

¹ This item is defined to mean the total number of patient days of hospital care for residents and includes days in state, county, or municipality or private hospital, whether the care is given at public or private expense, within or without the area.

NOTE: "Minimal" is defined to mean: slight lesions without demonstrable excavation confined to a small part of one or both lungs. The total extent of the lesions, regardless of distribution, shall not exceed the equivalent of the volume of lung tissue which lies above the second chondrosternal junction and the spine of the fourth or body of the fifth thoracic vertebra on one side.

FIGURE VIII

29. Medical Service—continued

	Value of Item	Item for Scoring	Value Assigned			
			HD	OOA	VA	Total
b. Visits by cases registered for antepartum supervision	10	10				
Standard: 3 visits per case registered						
Visits — 3 plus 10 points						
2-2.9 6						
1-1.9 2						
Visits ÷ cases registered						
..... = visits per case						
c. Blood tests for syphilis	6	6				
Standard: 95 per cent of cases carried for health department supervision tested						
Percentage — 95 plus 6 points						
90-94.9 5						
80-89.9 4						
70-79.9 3						
60-69.9 2						
50-59.9 1						
Less than 50 0						
Blood tests for syphilis ÷ individuals registered X100 =						
..... percentage tested						
d. Positive reactors treated for syphilis . .	5	5				
Standard: 100 per cent of positive reactors under treatment						
Percentage—100 5 points						
80-99.9 4						
70-79.9 3						
60-69.9 2						
50-59.9 1						
Less than 50 0						
Positives under treatment ÷ total positives X100 =						
..... percentage under treatment						

INDICES

The third section of the *Appraisal Form* is definitely experimental. Platt in an analysis of the *Appraisal Form* in 1927 pointed out that rating a community on a few typical items gave results which compared favorably with

the use of the larger Form. It proved that certain items had definite value as indices of the character of a community health service. Recently there has been a demand for a broader point of view in the formation of public health programs. It is now recognized

FIGURE IX
SELECTED INDICES

	Page	Area	State	States United
POPULATION				
2. Age distribution: Percentage under 20	5			
WEALTH				
9. Assessed valuation per capita	2			
SOCIAL AND ECONOMIC STATUS				
12. Percentage of persons 10 years of age and over who are illiterate	6			
HOUSING AND SANITATION				
20. Percentage of rural population having satisfac- tory means of excreta disposal	155			
21. Percentage of urban milk supply pasteurized . .	169			
VITALITY AND HEALTH				
24. Deaths under 1 month per 1,000 live births . . .	8			
30. Diphtheria deaths per 100,000 population	8			
35. Automobiles accident deaths per 100,000 popu- lation	9			
37. Percentage of deaths unattended by physician in terminal illness	26			
PERSONNEL AND FACILITIES				
41. Cents per capita expended for official public health purposes	18			
43. Population per physician	15			
PUBLIC HEALTH PRACTICES				
46. Percentage of population under 5 years im- munized against diphtheria	43			
48. Number of known living cases of tuberculosis on register per annual death from tuberculosis . . .	81			
55. Percentage of deliveries by midwives in home . .	8			
57. Percentage of preschool children registered for nursing supervision	125			

as desirable and necessary to consider composition and economic status of the population, the availability of health promoting facilities as well as the character of local health problems in program planning. In order to bring together certain items from which we may select reliable indices of these various factors when a sufficient volume of experience has been accumulated a tentative list of such items is included as Part III of the new Form (Figure IX). Out of such accumulated material we may eventually be able to discover some consistent relationship between economic and environmental factors, health status, and health practices. Only general use and time will tell whether this is a wise extension of the *Appraisal Form* or not.

USES OF THE APPRAISAL FORM

One of the most significant changes in the *Appraisal Form* over the past 14 years of its existence is the change in use. As originally designed it was primarily to serve as a rating schedule in order that city and rural health programs might be graded according to accepted standards of practice. Early editions carried little explanatory material which would indicate why criteria were selected or the basis for standards set up. In fact, the first draft of the City Appraisal Form did not even include a survey schedule. Experience soon indicated that the survey is the most useful phase of an appraisal and that the scoring is simply a convenient method of expressing the findings as they relate to the various phases of the service or the program as a whole. The Form was being used by many health officers as a guide to administrative practice. So, with this edition, this phase has been emphasized and strengthened by inserting brief statements throughout the schedule indicating the philosophy which the com-

mittee believes underlies certain services. In several states, aid from the state department is available to local health officers in making periodic appraisals. This has the obvious advantage of giving the health officer another pair of hands to assist in the collection of material and of providing a person with a disinterested point of view, which is always helpful in interpreting the findings of such a study.

With the introduction of the variable base for scoring, the Form becomes in fact primarily a manual of practice, chiefly useful to the administrator in studying the community needs, the function of his department with regard to a particular service, and this trend of development from year to year.

With the introduction of the selected list of health indices, a new instrument is suggested for brief, readily made summaries of the health conditions and needs, and of community characteristics bearing on these conditions and needs. Local health officers may find these indices, or a part of them at least, useful for periodic surveys and comparison. State health officers may find the indices of value to summarize and compare conditions among local areas or to follow trends for periods of time. Here is an experimental tool which may prove especially useful when detailed appraisals are unnecessary or impracticable.

In conclusion, may I reiterate that the Committee on the Appraisal of Local Health Work feels very deeply indebted to the health officers for continued assistance in the development of this document. It is your Form; its primary function is to aid you; without your use of it, your criticisms, and your help, it could not exist. It must keep pace with changing conditions and practices, and we continue to stand ready to serve you in keeping it up to date and as useful as possible.

Practical Methods for the Control of Hygienic Exposures*

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FOR the successful solution of any task or problem, certain information and knowledge is necessary. Certain tools and equipment are needed and quite often a certain amount of skill and technic comes in handy.

In launching a campaign for the control of industrial exposures, there are some prerequisites which are necessary for success and others which are highly desirable.

1. One of the first things to know is what exposures exist in your plants, what is the nature and extent of the exposure, what has been done to control them, how successful is this control. In short, a complete survey of the plant is necessary.

The use of the following headings is suggested for the form used in making this survey:

1. Department name and number
2. List of hazardous operations in the department
3. Nature of exposure in each hazardous operation
4. Number of workers exposed
5. Method of control in use
6. Effectiveness of this control
 - a. Based on health study of those exposed
 - b. Based on air analysis, etc.
7. Recommendations for improvement

Such a survey as this not only gives one a complete picture of the condition of your plant, but helps in determining the points against which your control campaign should be directed. It can also serve as a record.

2. The second necessary item is a physician or medical department that has specific knowledge of the hazardousness of various toxic substances, dusts, etc., from a health standpoint and that also has knowledge of the extent to which these exposures have affected and are affecting the health of the workers.

3. The third prerequisite is a plant engineering force that is interested in the problem and is well versed in the design, installation, and maintenance of hoods, exhaust systems, and other control mechanisms.

4. Another desirable factor is an interested, well informed, and coöperative plant supervisory force.

5. A fifth item which is desirable but not absolutely essential, is the necessary equipment for air sampling to determine dust concentration and air contamination. Such equipment is helpful in determining whether control is necessary and in checking the effectiveness of control used.

6. In view of the fact that the study and control of industrial exposures is of recent growth, it is often desirable to have one individual charged with

* Read at a Joint Session of the Industrial Hygiene and Public Health Nursing Sections of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

this responsibility. He should be able to coördinate the efforts of the existing medical, engineering, and plant supervisory forces.

GENERAL METHODS OF CONTROL

The overall objective is, of course, to remove all exposures, or, failing in this, to limit exposures to the point where there is no danger, *i.e.*, sub-threshold exposures.

Following is a list of the methods of control generally used in industry to accomplish these objectives:

1. Substitution of a safe material for the one causing the exposure, as the use of less toxic solvents for benzol and the use of steel shot for sand in cleaning.

2. Substitution of a safer process for the one causing the trouble, such as wet grinding and drilling for dry grinding and drilling and the use of a wet process in making and handling plates for storage batteries.

3. By preventing the escape of toxic substances and harmful dusts into the air which is used by the workers.

This is accomplished in two ways: first, by making the operation entirely automatic, thus eliminating the worker and then enclosing the equipment so as to prevent the escape of harmful substances. Examples of this method are automatic sand blasters and painting by conveyor dipping or automatically controlled spray guns. Second, by power exhaust ventilation. This method is the most practical and most generally used for the removal of gases, fumes and dust when a worker is essential for the operation. A suitably designed hood is placed close to the source of the trouble, and a suction fan draws the polluted air away to either the outside or to a filtering plant or dust collector.

4. By the use of protective equipment by the worker, such as goggles for eye protection from glare or flying

particles, rubber gloves, boots or aprons from acids, oils, solvents, etc., respirators against dust, and gas masks against toxic gases and fumes.

5. By the exercise of proper hygienic care on the part of the worker—proper washing and bathing by those who work in oil, and observing certain health rules by lead workers.

6. By lowering the exposure. This is accomplished by the rotation of workers to less hazardous jobs or by shortening the working hours.

7. By selecting employees for hazardous exposures who are the least susceptible to those exposures. Those who are to be subjected to exposures from dust, fumes, and gases should be free from respiratory difficulties. Lead workers should be free from previous exposures and from ailments of the alimentary tract. Those who are to work in oils, paints, etc. should be free from skin disorders.

PRACTICAL METHODS OF CONTROLLING CERTAIN EXPOSURES

DUSTS

In general there are two classes of dust to be considered:

1. Those capable of producing respiratory troubles, such as fibrosis of the lungs.

2. Those that may cause systematic poisoning, such as lead compounds, etc.

In those industries where many of their products are shaped from cast iron (as is the case with Delco-Remy) the problem of exposures from the dust created by the machining of cast iron, is an important one. While Dr. Sampson, in his recent study of iron ore mining, is of the opinion that ferrous oxide dust is not conducive to tuberculosis, one has in cast iron machining, mixed with the iron dust, considerable silica dust which comes from the sand used in coring and molding. And, of course, with silica there is the danger

of silicosis with its attendant tuberculosis.

Previous to 1934, very little effort had been made by our company in controlling the dust hazard in our cast iron machining departments and as a result work in these departments was considered a dirty job. The workers were convinced, and possibly logically so, that any respiratory difficulties which they had were either caused by or aggravated by the dust to which their work subjected them. Labor turnover was relatively high. Sufficient data are not available to determine whether there was any increase in the tuberculosis rate. The tendency to such an increase was offset by our practice of transferring men "out" of the department to other lines of work based upon the recommendations of the medical department.

During the summer of 1934, the Metropolitan Life Insurance Company made a rather extensive survey of our plants. As a result of this and subsequent surveys by that company and by ourselves, an extensive campaign of dust control has been carried out. On the original survey before any control methods were in use, the dust concentration in our cast iron machining departments ranged from 5 to as high as 12 and 15 million particles per cubic foot of air. Since the installation of exhaust systems, these counts are now as low as 1 million and seldom in excess of $2\frac{1}{2}$ million particles per cubic foot of air. The jobs are now relatively clean and there is little or no complaint on the part of the workers. In fact, these departments are considered very satisfactory places in which to work, and the requests for "transfers out" are few.

The most practical way for removing dust is to place a suitably designed hood around the source of the dust and by a suction fan to draw the dust laden air to either the outside or to a dust

collector or filtering system. In view of the fact that the installations of exhaust systems vary considerably with the different types of machines, they are difficult of description.

In general, in the design and installation of exhaust systems, several points should be kept in mind, namely:

1. A given velocity of air is required to carry dusts of a given density—4,000 feet per minute is recommended for most dusts, 5,000 for lead and 2,500 to 3,000 feet per minute for gas, fumes, smoke, etc.

2. That the area of the hood opening must be kept in such a proportion to the area of the pipe carrying the air away from the hood that the velocity of the air in the opening does not fall below the velocity required for moving the dust.

3. The design of the hood is of great importance as the efficiency varies decidedly with different hoods. Also the hood surrounding the source of dust must be so designed and shaped that it will not slow up or hinder the loading or unloading of the fixture on the part of the operator. Otherwise his tendency is to disregard the use of it.

4. The question of heat loss in cold weather must be considered if the dust laden air is to be discharged to the outside. Such a consideration may make it advisable to run the air through a filtering device and then back to the plant.

Occasionally, due to the possible short life of the product or of the particular method of machining in use, the outlay for an exhaust system is inadvisable from a financial point of view. In one such case in machining cast iron, the dust count was reduced from around 15 million to well below 5 million particles per cubic foot of air by the simple expedient of removing all air hose and substituting brushes for cleaning off fixtures and by having the floor swept up after the regular force

had gone home from the shift. If at all possible, holding fixtures should be so designed as to permit the chips and dust to fall free and thus do away with the necessity of blowing them off with air, which increases the dust in the air considerably.

The engineer engaged in designing and installing exhaust systems, having, as he does, a type of mind which demands exactness, would be pleased if he had a definite figure for permissible dustiness. In this regard Drinker states that "the point has not been reached where a manufacturer can be told with certainty that his plant will have no silicosis if he keeps dustiness down to some definite figure."

The varying susceptibility of the employee, the period of exposure, the type of dust, the amount of free silica, the lack of uniformity in concentration are factors which make it difficult to set a figure of permissibility, and one might also add, the lack of definite data.

In the South African gold mines where the dust is said to contain more than 85 per cent free silica, a tentative standard of 8.5 million particles per cubic foot has been set as the upper limit of dustiness allowable.

From the results of a study made by the Public Health Service in the granite cutting industries it was found practicable to suggest a tentative standard for the upper limit of allowable dustiness between 10 and 20 million particles per cubic foot of air for workers exposed to dust resulting from granite cutting. The same limit would presumably be applicable in the case of other dusts of the same physical characteristics, particularly with a silica content of 35 per cent.

The Industrial Commission of Wisconsin reports as follows:

The maximum silica-dust concentration considered permissible in the air breathed by a workman at any point in the normal breathing zone has not been definitely estab-

lished. The commission, its advisory committee, employers, and scientists have agreed on a tentative figure of 15 million countable dust particles under 10 microns in longest dimension with free silica content of 35 per cent in a cubic foot of air as determined by U. S. Public Health Service technic. Variations in free-silica content will make proportional inverse changes in this standard. In the case of practically pure silica the permissible dust count would be 5,250,000 countable particles.

More recently other states have established a standard of permissibility in the neighborhood of 10 million. Therefore, in order to give our plant engineering staff a goal toward which to work our company has set up empirically a figure of 5 million particles per cubic foot as being the high range of permissibility. In view of the fact that all of our castings are made from permanent iron mould, and the only source of sand is from the sand cores, it is felt that this figure of 5 million is well on the safe side.

The discussion up to this point has had to do with dusts containing silica. In an average manufacturing plant there are usually a number of other dusts present which are not particularly harmful in that they are not fibrosis producing. However, in view of the fact that dust of any kind is disagreeable and that the average worker feels that "dust is dust," and that any respiratory irritation which he may experience is due to the dust, and since the average practising family physician will usually concur with him in his belief, our company has adopted the policy of controlling all dusts regardless of their nature.

PLATING HAZARDS

Several years ago, our company experienced considerable health difficulties in our plating, particularly chrome plating. Due to the extreme heaviness of chrome fumes the usual method of exhaust ventilation was inadequate. Our troubles continued until new

chrome plating equipment was purchased wherein the control of fumes was an integral part of the equipment. By the present method, the heavy chrome fumes are pulled downward by suction through openings at the edges of the tank, to a container underneath, where a large portion condenses. This air is then drawn through a vertical duct to a cylinder of approximately twice the diameter of the duct. This cylinder has a series of baffles which, assisted by the lowered velocity, entraps the remaining chrome and it is washed back to the container underneath the tank by a small stream of water. This chrome solution which thus collects is added to the original chrome tank.

With this new system, the air shows no trace of chrome and our health difficulties have vanished.

In zinc, copper, cadmium, and nickel plating, theoretically at least, no gases other than oxygen and hydrogen are given off. Actually, as the plating is speeded up, the plating solution becomes heated and some of the solution is carried off with the oxygen and hydrogen in the form of a mist. Thus with the advent of faster and more up to date plating methods, it has been necessary to cover the tanks and provide forced exhaust ventilation.

LEAD

For 10 years, our company has been engaged in the manufacture of storage batteries. No serious cases of lead poisoning have occurred and only occasionally has an employee had a slight touch of it. In general our method of control is as follows:

1. Employ only those people who have been free from lead exposure in the past and only those who are free from ailments of the digestive organs.
2. Isolate all operations which may give off lead dust from those that do not.
3. Keep the floors, paste machines,

conveyors, and pasted plates wet at all times to prevent the giving off of dust.

4. Make regular analysis of the air for lead at the strategic points of exposure and endeavor by means of exhaust controls to hold the lead content of the air down to a safe point.

5. Physical examination of all lead exposed employees once a month, and at the slightest indication of lead intoxication, transfer the worker to a job with little or no exposure.

6. Require the worker to wear a respirator in those few places where the lead concentration is above a safe point.

7. Insist on personal cleanliness and hygiene on the part of the worker.

SOLDERING

Throughout our plants, there are soldering operations which are done by machine, by dipping or by an electric solder iron. Most of these operations are provided with exhaust ventilators, not so much to prevent lead absorption, as to remove the smoke incident to the burning of the flux and insulation on the parts being soldered.

BAKELITE

In our bakelite department, the bakelite power is formed into a pill of appropriate size and shape for use in molding.

These pill machines are entirely enclosed in a small room which is provided with exhaust ventilation.

OILS

The control of skin disorders of employees working in oils has always been a difficult problem.

Many different approaches have been made by different concerns. Our company has tried a variety of measures. Our method of approach at present is as follows:

1. A central supply system from which oil is supplied to all plants. This system has a storage tank for new oil

and a settling and filtering set-up for used oil.

2. Use of a protective hand ointment.

3. Program of cleanliness with proper wash room facilities provided.

4. Discontinue the use of kerosene and gasoline for washing hands and use a mineral seal oil instead.

With 400 operators working in oil, there has been only one minor case of so-called oil poisoning in the past 2 years. It is our belief that personal

cleanliness is the greatest factor in control.

This completes the list of hygienic hazards with which our company has had to deal. I realize that many of you have numerous other hazards that I have not discussed, because we have had no experience with them.

I believe any company, with a certain amount of determination, plus reasonable intelligence, can successfully control its plant hazards.

DISCUSSION

ASSEMBLED BY CHARLES L. POOL, F.A.P.H.A.

Chief Engineer, Division of Industrial Hygiene, State Department of Public Health, Providence, R. I.

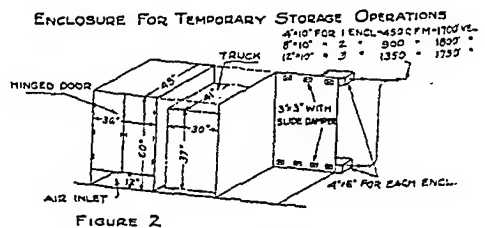
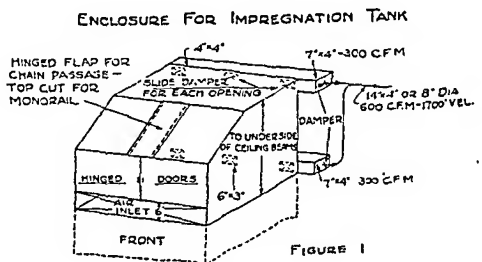
MR. COBURN has outlined the methods available for controlling hygienic exposures and has shown how good engineering practice is able to surpass the physiological dicta in vogue. In order that a prepared discussion might have working value industrial hygienists were asked to submit practical examples in condensed form.

Reduction of Benzol-Toluol Vapors—Gray¹ arranged for Postman² to contribute data on their bureau's study leading to correction of exposures to benzol and toluol vapors from impregnation of clutch disks. The Connecticut Department of Health Sanitary Code stipulates maximum concentrations of 100 p.p.m. for benzol and 200 p.p.m. for toluol.

Six minute runs during insertion and removal of disks from an impregnating tank exposed the operator to an average of 350 p.p.m. (490 p.p.m. when a nearby window was opened) of toluol, causing watering of eyes at peak concentrations, and similarly, to 520 p.p.m. of benzol (21 min. run). Twenty minute samples of (a) aisle air between drying ovens showed 920 p.p.m. of

toluol and (b) breathing level near drying racks, 480 p.p.m. Through a 7 minute period during removal of disks from drying oven the activated charcoal determination showed an exposure to 150 p.p.m. of toluol (but results may be too low at the high temperatures).

Recommendations included sketches



(AFTER OUTLINE SKETCH BY)
CONN. STATE DEPT. OF HEALTH
BUREAU OF OCCUPATIONAL DISEASES
D. F. POSTMAN - INDUSTRY ENG

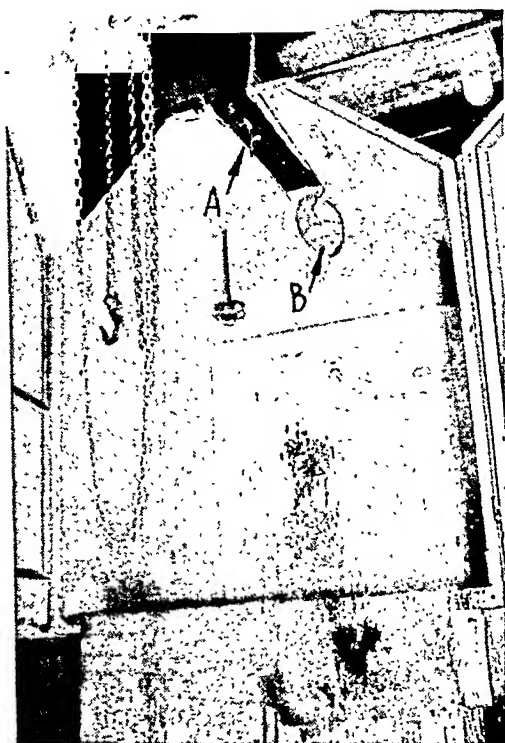


FIG. 3—Interior View of Enclosure Over Impregnation Tank Showing:

- A—Slot for Passage of Chain-Hoist
- B—Single Exhaust Connection

and outline of designs for control of vapors at points of generation. Fig. 1 outlines an enclosure for impregnating tanks, and Fig. 2 a ventilated chamber for temporary safe storage of treated disks between operations. Fig. 3 shows an interior view of the enclosure in place over an impregnating tank. An enclosure outlined for the floor pressing operation was about 25' long, 18" wide and 30" high, with a dampered opening to each of 16 pressing stations (60 c.f.m. for each). Hinged doors open up each pair of stations. Ducts 8" by 5" convey vapors to a fan suction (10" dia., 750' vel., 950 c.f.m.).

Suggestions included means for achieving results without hampering the operations, for conserving vapors by double walled tank enclosures, or water-jacketing of exhaust lines where the solvent (toluol) is used hot, dampers for conserving vapors when the en-

closures are in place, leak-proofing of dryer housings with maintenance of slight suction, handling of solvents and solutions by pipe line to eliminate addition to tanks from open buckets, stirring with paddles, and emptying by ladles, and use of canister type respirators for the irreducible occasional exposures, e.g., during removal of racks of disks from tanks, and transfer to floor pressing operation.

Determinations of resulting exposures are planned. The installation did not follow the outline in every detail but results are obviously satisfactory.

Isolation of Dusty Process—Lamenzo³ described an ingenious application of engineering to accomplish inexpensively an improvement in dust control which first looked costly. In making clutch facings, asbestos was loaded into beaters and wet down. From several possible solutions, the insurance carrier recommended to the manufacturer that loading from the beater floor be changed to loading through a chute from a ventilated enclosure placed on the floor above (see Fig. 4).

Asbestos dust on the beater floor was

APPLICATION OF VENTILATION
TO EXTREMELY DUSTY OPERATION

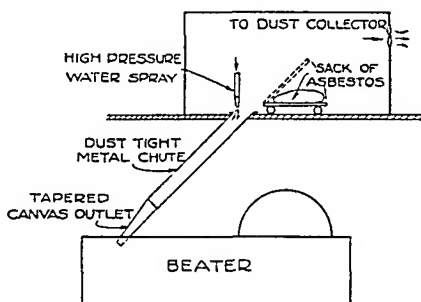
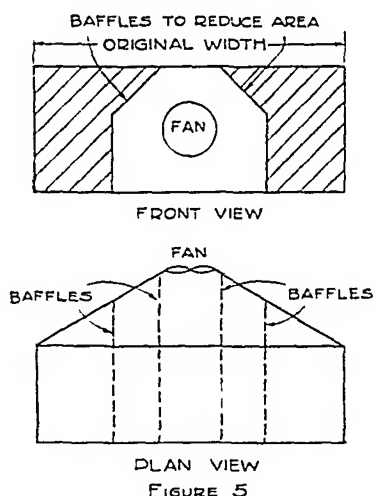


FIGURE 4

AFTER SKETCH BY
HARTFORD ACCIDENT & INDEMNITY CO
J. B. LAMENZO, RESEARCH ENGINEER

ALTERATIONS TO INCREASE HOOD EFFICIENCY



AFTER SKETCH BY
LIBERTY MUTUAL INSURANCE CO.
S. W. GURNEY, RESEARCH ENGINEER

reduced from 38 million particles per cu. ft. to very little, if any, remaining. Exposure of 25 men was reduced to exposure to one man, part-time, who was induced actually to wear an approved respirator and to undergo semi-annual physical and X-ray examinations.

Increasing Hood Efficiency—Gurney⁴ gave an example of inexpensive home-made alterations on a hood to eliminate cases of lead poisoning among operators of spray guns applying enamel of which the base was a glass frit containing 35 per cent lead. The average velocity at the hood openings was 72 f.p.m. Lead content at the breathing zone was 3.6 mg. per 10 cu. m. of air. Panels were installed as shown in Fig. 5. These increased the average velocity at the new opening to 220–235 f.p.m. with reduction of lead to less than 1 mg. per 10 cu. m. of air, and elimination of cases of poisoning.

Dust Control in a Ceramic Plant—Schulze⁵ prepared the following description exemplifying the application of control methods to existing apparatus.

The Porcelain Enamel and Manufacturing Company in Baltimore is engaged in the

manufacture of enamels. One of their problems was the protection of workers from dust generated in the dumping of raw materials into batch containers placed on a platform scale below the floor level. The fact that an appreciable amount of free silica in the form of flint is required in each complete batch weighing operation motivated the management to supply those engaged in this occupation with respirators of an approved type. However, since other operations are carried on in the same room it was recommended that steps be taken to reduce the dust concentration in connection with the weighing operation. The management designed and installed the dust collecting system as shown in Fig. 6. The dust-collecting bag was made of unbleached muslin (36" wide by 27' long) at a cost of 7 cents per yard. The muslin used is known as 80 square mesh or 80 threads per inch. The cost of the installation including material and labor was estimated to be about \$88. A pipe connected to a motor-driven exhaust fan leads to an opening in the weighing pit; the exhausted dust-laden air is blown into the large filter bag suspended from the ceiling.

DUST REMOVAL SYSTEM FOR WEIGHING OPERATION

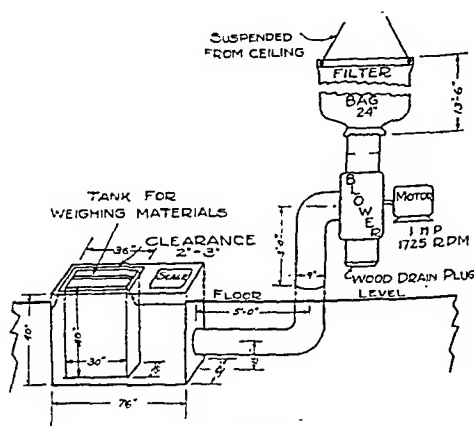


FIGURE 6

AFTER SKETCH BY
BALTIMORE CITY HEALTH DEPT.
BUREAU OF ENVIRONMENTAL HYGIENE
WILMER H. SCHULZE, DIRECTOR

The efficiency of the installation was determined by making dust counts of the air during the dumping and weighing operations with the dust removal equipment in operation and without the use of this apparatus. Dust concentrations were determined by the impinger method using the procedure of the U. S. Public Health Service.

Dust Concentrations—Millions of Particles per Cu. Ft. of Air	
Dust collector not operating	86.4
Dust collector operating	2.1

Visual inspection of the pictures taken of the weighing operation with and without the use of the exhaust system also show a striking difference in the dustiness of the air.

See Fig. 7 (Companion photo, in which no dust is seen, is not shown).

Design Fundamentals for Movable Hoods—Bowditch⁶ made available data sheets prepared by Hemeon⁷ from studies of their bureau to outline for industries a practical solution of stone cutting hazards. These were condensed:

Essentials of Banker Exhaust Ventilation: A suction device for each banker to keep the quantity of granite dust below 10 million particles per cu. ft. of air. For suction devices with hand pneumatic tools independent of and outside of the exhaust hood, an air velocity of at least 200 f.p.m. at a point 7" from center of face of hood resting on face of the stone; 6" when hood is hung unobstructed. Hood easily movable and kept within 6" of point of tool.

Recommendations: I. *Air Volumes, Plain Unobstructed Hood*—Withdraw not less than 540 c.f.m.

II. *Air Volumes, Flanged Hood*—Withdraw not less than 400 c.f.m. Flange may be metal, rubber, etc., approximately 3" wide and attached to the two sides and top of the hood which rests on the stone to be cut. Hood efficiency may be increased by the attachment, by a removable pin, of a device to encircle the cutting end of the 4-point chisel.

III. *Duct Construction*—Duct work laid out with fan near middle to exhaust nearly equal number of units from each side. Branch ducts connected to main at angle not greater than 45° and close to the large end of a tapered section. Ducts not to

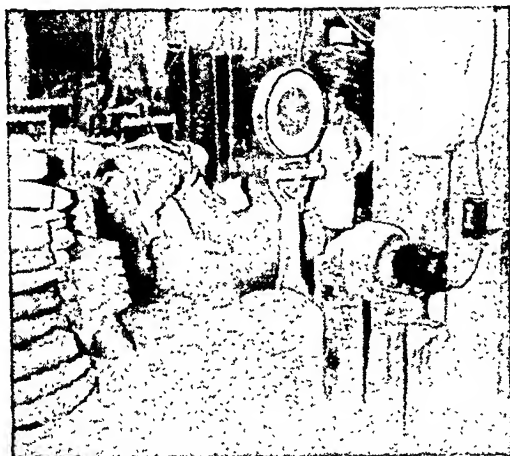


FIG. 7—Weighing Operation. Exhaust System Not in Use.

extend into main. Elbows formed of not less than 5 sections for 5" ducts and 7 sections for larger ducts, with long curve. (The radius of curvature of center line of elbow at least 1½ times diameter.) Enlargements on a gradual taper. Clean-outs for ready cleaning of ducts; e.g., bends, junctions, dead-ends, foot of risers. Dusty air disposed of without recontamination of atmosphere.

IV. *Fan Size*—Determined by diameter of main through which air from all branches flows. Usually of such size that its inlet is not smaller than the main connected.

V. *Fan Speed*—Having fixed fan's inlet diameter, find at what speed it should operate from manufacturer's specifications—(a) capacity desired in terms of total c.f.m., (b) suction necessary at fan.

a. *Capacity of Fan*—Insure that the units at the end of the system get their full quota of air. Units near the fan draw more than those at the end, without balanced flow. Allow for a fan capacity greater than 400 c.f.m. per banker. Allowances estimated for layouts in supplement hereto given for installations of various sizes.

b. *Suction at Fan*—Depends mainly on loss through flexible suction device.

BANKER DUST EXHAUST SYSTEM
 TYPICAL PIPING LAYOUT FOR RUEMELIN UNIT
 (AND FOR C. F. BERG UNIT, FIGURES IN BRACKETS)

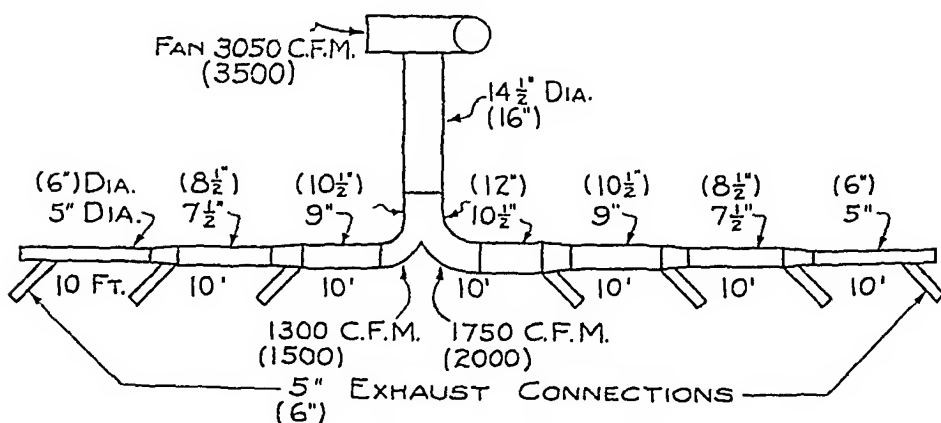


FIGURE 8

AFTER SKETCH BY
 MASS. DEPT. OF LABOR & INDUSTRIES
 DIVISION OF OCCUPATIONAL HYGIENE

Varies with type. See supplement.

VI. *Motor*—Size depends on fan capacity, desired suction, and fan efficiency. See supplement. Fan driven by motor through belt drive, rather than by direct connection for small speed adjustments for efficiency by changes in pulley size.

Maintenance—Performance of each unit checked by U-tube at least once a month. Cause of any drop in efficiency exceeding 10 per cent remedied.

Supplement is a guide only. Note the limitations stated. If layout requires departure from the essentials, figures given should not be used. No one type of unit is favored above another.

Supplement—The Ruemelin (or the C. F. Berg) Banker Exhaust Unit. Note: Values for C. F. Berg unit given in brackets.

Duct Sizes—When using flanged hoods with the Ruemelin (or C. F. Berg) Banker Exhaust Unit and minimum air volumes indicated, duct sizes

listed in Table I and Fig. 8 are advised. Where 5" (6") ducts from each of two banker exhausts join, increase the duct size by taper to a 7.5" (8.5") dia. Where a third 5" (6") exhaust duct joins the 7.5" (8.5") duct, increase the size to 9" (10.5") and so on as in table. Sizes larger than listed may result in deposits in ducts. Sizes smaller require excess power. Use larger sizes when air volumes are greater than the minimum specified.

Suction at Fan—The Ruemelin (C. F. Berg) Banker Exhaust Unit has an inside hose diameter of 4" (4.75") (C. F. Berg duct slides vertically inside a 5" duct and the connection after the chip trap is 6" in dia.) The Ruemelin connection to branch pipes is 5" in dia. To exhaust 400 c.f.m. through this device with a flanged hood, maintain a suction after the trap, as measured by a U-tube, of 3.6" (2.3") of water (and 470 c.f.m. for the C. F. Berg unit, to cover leakage). In general, necessary "fan static pres-

sure" will vary from 4" (2") to 6.5" (3"), depending on size of installation and arrangement of ducts.

Hood Characteristics—Check performance by static suction measurements at the hood, taken from at least 4 holes, beyond hood elbow and just before ball joint (10" to 12" above hood elbow), using a minimum air flow of 400 c.f.m., a suction at hood of 2.6" (0.8"), and hood coefficient of 0.93 if with flange; use 540 c.f.m., 6.7" (2.0"), and 0.78, respectively, if without flange. If suction is between 3.7" (1.1") and 6.7" (2") without flange, system may be made to conform by attaching flange.

Motor Size—Depends on number of bankers, suction loss, and fan efficiency. Estimated sizes for systems of various numbers of bankers up to ten are tabu-

tively insoluble, such methods of house-keeping as vacuum cleaning in the "Dipping Room," and mechanized application of glaze.

A typical glaze formula shows 61 per cent silica and 11 per cent lead oxide. It is becoming more common to fuse some constituents of glaze into "frit" to add in ground-up form to the glaze. This renders the lead difficultly soluble. The frit (perhaps 31 per cent flint) may constitute a third of the glaze. A typical glaze showed 28.5 per cent white lead. A wet ball mill produces from the constituents a fluid into which ware is hand dipped, dried, and handled before firing. Exposures are being reduced still more recently by glazing with the aid of automatic equipment in mechanically exhausted booths. These machines

TABLE I

Number of Bankers	Approx. Min. Fan Capacity (c.f.m.)		Duct. Dia. and Min. Fan Inlet Dia. (In.)		Approx. Min. Size Motor	
	Ruemelin	(C. F. Berg)	Ruemelin	(C. F. Berg)	Ruemelin	(C. F. Berg)
1	400	(470)	5	(6)	0.75	(0.5)
2	850	(970)	7.5	(8.5)	2	(1)
3	1,300	(1,500)	9	(10.5)	2	(2)
4	1,750	(2,000)	10.5	(12)	3	(2)
5	2,200	(2,600)	12	(13.5)	5	(3)
6	2,700	(3,100)	13	(15)	5	(3)
7	3,200	(3,700)	14.5	(16)	7.5	(5)
8	3,700	(4,300)	15.5	(17)	7.5	(5)
9	4,200	(4,900)	16.5	(18)	10	(5)
10	4,700	(5,500)	17.5	(19)	10	(7.5)

lated for bankers not much over 10' apart and no long ducts, particularly in the 5" (6") and 7.5" (8.5") sizes.

Economic Recovery of Pottery Glazes with Reduction of Dust—Rothmann⁸ furnished an illustration of control measures which pay in recovery of material and in reduction in severity of exposures in the pottery industry.⁸ Exposures to lead in the manufacturing of vitreous dinnerware has been lessened in recent years by improved housing, air sanitation, use of fritted glazes wherein the lead used is rendered rela-

tively insoluble, such methods of house-keeping as vacuum cleaning in the "Dipping Room," and mechanized application of glaze.

In the new booths, glaze is sprayed by pressure jets against ware on a conveyor belt. Exhaust ventilation removes the mist to bag filters for recovery. For over a year maintenance cost has been insignificant and the usual shaking of bags has been sufficient to clean them.

An arrester unit studied weighed

8,500 lbs., occupied 1,445 cu. ft., had a free cloth area of 1,920 sq. ft., required a 7.5 H.P. motor, static pressure 5.4" water, velocity pressure 1.2" water, air 4,200 c.f.m., spray booth openings (both booths) 10.5 sq. ft., 400 f.p.m. air velocity at opening. Glaze recovered, 7.0 lbs. per hr., would be worth about \$610 per year if unit ran 40 hrs. per week.

Seven to 12 dust samples for each of three conditions of glazing showed for hand dipping, no ventilation, 7.4 million particles per c.f., ave., and 35.0 max.; for spraying without exhaust ventilation 28.3 m.p.p. c.f., ave., and 107 max.; for spraying with exhaust ventilation 3.5 m.p., ave., and 7.1 max. A run to show efficiency of collector system showed 1.2 m.p. at breathing level of booth attendant, 115 m.p. inside duct above booth, 114 m.p. near inlet to cloth filter and 1.5 m.p. in exhaust stack from filter.

Lead exposures in mg. per 10 cu. m. were found to be 1.2 for "hand dipping," 6.8 for "removing hollow ware from mangle" (excess glaze rubbed off), 167 for occasional "frit making, hand shoveling," 18.7 for loading ball mill, 12.7 for loading rotary frit furnace, and 4.4 for spray machine operation. Two to 9 samples in each of these cases did not vary greatly from the mean except in the last (0.7 min. to 65.0 max.) where performance of exhaust and size of ware were the important factors.

Reduction of Dustiness—Through Boyce⁹ a contribution from Nichols¹⁰ on practical reduction of dusty conditions found during the conduct of the Kansas program covered, (a) the recommendation that granite and monument concerns utilize dust filters on sandblast exhausts which were usually found to discharge so close to buildings as to re-contaminate the enclosures. From one installation it was estimated that these should cost from \$30 to \$40

with negligible upkeep; (b) correction of a hazardous condition studied at a smelting and mining company where three pigments, leaded zinc oxide, zinc sulfate, and lithopone are made from lead and zinc sulfide ores. Slag from roasting the ores is crushed to cinder for roadbed ballast. During shovelling of slag the dust count revealed 18 m.p. per c.f. (70 per cent free silica). A rather simple procedure of wetting kept down a large amount of this dust, and after being recommended to the company, was followed.

Alteration of Essential Process—McCord¹¹ furnished an informative example of substitution of a non-dusty for a dusty process.

In offset printing, it is common practice to spray on each freshly printed sheet of paper a suspension of gum tragacanth, gum arabic, or starch in alcohol as an anti-smearing agent. The atmosphere becomes charged with gum arabic dust, gum tragacanth dust, etc. The can containing the mixture is placed 3' or 4' above the receiving rack on the press. With the arrival of each sheet automatically the valve on the can is tripped, and air pressure blows the gum mixture into the air and on to the sheet.

Due to exposure to this dust, and particularly gum arabic, a number of printers in divers shops developed asthma and whenever again exposed presented asthmatic manifestations.

It has proved practical to eliminate the sprays and to substitute a series of minute gas flames. This apparatus may be made by introducing a number of gas tips into a sufficient pipe length and affixing this with an automatic control to play flames upon the undried sheet for an instant without charring the paper or changing the color of the ink.

Conveying Collected Dust in Exhaust Systems—Hatch¹² prepared the following description of practical elements of design:

Dust captured at exhaust hoods is commonly conveyed to a central collector located some distance from the dust producing operations. The air stream itself is used to transport the dust, and for coarse materials and heavy concentrations high velocities are required. The most common pipe velocity is 4,000 f.p.m.

High pipe velocities are objectionable for several reasons:

1. The power consumption and operating cost are high.

2. The abrasion of elbows and pipes is rapid and maintenance therefore troublesome and expensive.

3. A careful balance of the system is required in order to insure proper distribution of the air flow and adequate transporting velocities at all points.

This balance is upset when any departures are made from the layout established in the original design. In addition to these disadvantages one must point out further that even a high velocity becomes inadequate if the material is wet or greasy. Thus it is difficult and expensive to obtain continuous operation of a dust exhaust system without plugging the exhaust mains with dust.

To obviate these difficulties hoods should be designed so far as possible to prevent the removal into the exhaust system of coarse material and the piping located so as to reduce to a minimum horizontal runs of pipe. If a header pipe is required in order to accommodate the several branch pipes, recent practice indicates that the header may be of large cross-sectional area, thus reducing the velocity to a low figure to insure a constant settling of material in the header. A chain drag or other suitable means must be provided to convey the settled dust to a suitable storage chamber. For a compact grouping of machines the low velocity header may take the form of a settling chamber with a hopper bottom for direct discharge of the dust without further conveying. Because of the negligible resistance in the low velocity header a balanced system is insured without regard to the location of the branches or change in location from the original layout. Connection to the fan and the dust arrester required for the fine material which escapes settlement may be made at any convenient point on the low velocity header.

The cost of mechanical conveying is high, and the main header of large cross-section is also costly, but against these one may credit:

1. Reduced power consumption
2. Abrasion of pipes and elbows eliminated
3. A balanced system insured

Mechanical conveying has been used in

exhaust systems in connection with wood-working machinery for several years, and is attracting considerable attention at the present time with respect to other types of dust. Installations which have come to the writer's attention recently included grinding and shaping machines for porcelain insulators, truing machines in abrasive wheel manufacture, dust control in cement manufacture, and crushing, screening, and conveying ore. The success obtained with these systems indicates this method of design will be used more in the future.

Extensive Alterations to Eliminate Lead Poisoning—Stratton¹³ outlined a case in which a concern spent \$25,000 to eliminate excessive exposure to lead dust of 200 persons among whom a number of serious lead cases had developed. Cast iron parts were enameled. A tunnel firing kiln used natural gas. The waste gases from the kiln fed the driers through which the sprayed parts passed on conveyers. Pumping the hot gases from the driers back into the spray hoods more than offset the total ventilation of the building through the spray hoods and other means. Lead dust was distributed throughout the premises.

A study was made, and through changes in fan capacity, duct diameters, and the installation of air curtains at spray booth openings, the amount of lead dust in air was reduced to a point of safety. Intensive medical and hygienic control of employees was maintained until constant checks of ventilation performance showed that they could work safely entirely unhampered, which convenience, together with the improved conditions, has probably more than repaid the expense.

Elimination of Plumbing Hazards—Connolly¹⁴ described examples of a common type of lurking exposure not likely to be considered by industrial hygienists unfamiliar with other branches of public health engineering.

A water pipe was found with its end submerged in a silver-plating tank

in a manner to make possible siphonage of potassium cyanide into the drinking water lines of the building if the supply pressure should fall below atmospheric pressure. Since these pressure drops are not rare, it was fortunate that this connection was changed to break any possible siphonage train before a combination of circumstances poisoned several hundred persons.

Continuity of connection was also ordered broken, in factories where water was circulated through water-cooled jackets and condensing coils of degreasers and terminated in pipes submerged in sewers, slop tanks, or vats containing various solutions.

Dust Reduction by Installation of Machinery—Pincus¹⁵ asked that a description of an accomplishment by their sanitary bureau be prepared by Tobias¹⁶ to illustrate the elimination of a dust exposure and possible silicosis exposure among 600 employees, of whom 12 sandpapered book edges by hand.

Dust was practically eliminated and 10 employees were released to another department by the installation of Paper Cutter, Model 265, of the Challenge Mach. Co., Grand Haven, Mich.,*

capacity 1,500 books per 7 hrs., knife cut 26", materials: old books to be renovated, stand operated with 2 employees at about \$4.50 each per day, cost 3.5 cents per book.

DISCUSSERS

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2. Benjamin F. Postman, Industrial Hygiene Engineer, Bureau of Occupational Diseases, State Department of Health, Hartford, Conn.
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5. Wilmer H. Schulze, Director, Bureau of Environmental Hygiene, City of Baltimore Health Department, Baltimore, Md.
6. Manfred Bowditch, Director; and
7. W. C. L. Hemeon, Engineer; Division of Occupational Hygiene, State Department of Labor and Industries, Boston, Mass.
8. S. C. Rothmann, Industrial Hygiene Engineer, West Virginia State Compensation Commission.
- S. C. Rothmann. Subsequently amplified in *Indust. Med.*, 8, 1:8-12 (Jan.), 1939, q.v. Example of installation.
9. Earnest Boyce, F.A.P.H.A., Director and Chief Engineer; and
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Cost Accounting*

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IN the administration of public health there are certain fundamental business principles which must be applied for the proper conduct of affairs.

In business and industry, particularly where the number of stockholders is large, there always exists a demand for accuracy as well as a desire for standardization of financial statements. Bankers loaning money to private business and corporations, and investment institutions arranging for new finances, have emphatically encouraged this trend. All parties concerned have recognized the value of having such statements audited by disinterested parties. The result of this has been the development of specialists, of properly accredited and trained accountants, engineers, and appraisers who play an active rôle in the interpretation of the component parts of financial statements in accordance with established procedures, with the ultimate result that accurate reports reflecting conditions are made in such a manner that their meaning is entirely clear—clear not only to the directors of the corporation and the bankers but to the rank and file of stockholders as well.

The business of public health is not a private undertaking without outside capital. It is administered with the funds levied on numerous taxpayers

who, as stockholders, have come to expect clear and concise statements on the expenditure of their tax dollar, just as they do from industry. As in business, the taxpayer finances accredited and trained personnel to the measure in which his confidence in that personnel is maintained. The taxpayer who holds his "stock" in public service and the one who is taking stock of public service is entitled to periodic, understandable statements and balance sheets. Further, the taxpayer-stockholder has recognized the value of having such statements audited and appraised by disinterested parties, but in many instances he is still in a quandary in so far as public health cost statements are concerned. He is deeply conscious that nomenclature is not as yet standardized and that per capita cost does not always necessarily mean per capita cost. He knows that there is quite a difference in degree of services performed that needs to be clarified so as to make public health cost comparisons really possible. He knows, for instance, that in one city the school health work is done by the health department as a regular activity of that department while in another city there may be a school health department maintained by a separate budget. He knows that in another city private or outside subsidy, such as Parent Teachers Associations, Visiting Nurses Associations, and tuberculosis associations, or a county charities department provide certain services

* Read before the Health Officers Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

that must be performed by health departments in other cities not so fortunate with subsidies.

Many taxpayer-stockholders look to detailed "functional cost" for comparison rather than to "per capita cost." They have learned that functional cost is truly comparable only within a city, or within a county, because different cities and different counties vary in their conception or need of the functions sometimes compared. There is also a variance in local problems. Per capita costs ignore the need for increased functional activity in one area that is nonessential in another. For instance, tuberculosis control can be an important essential function in one area while in another it is of relatively little importance because of the freedom of influx of such cases. The same is true of health education. The taxpayer knows that there exists a vast amount of room for improvement on standard nomenclature as applied to functions performed in public health and that until nomenclature becomes more definitely standardized truly intelligent comparisons are an impossibility.

The Los Angeles County Health Department, with due consideration of the American Public Health Association's *Appraisal Form*, has developed a nomenclature to meet requirements of the Los Angeles County Health Department in its activities with 38 contract cities and a large unincorporated area. The code may not be regarded as the acme of perfection but it is definitely an index to the possibilities of a functional cost code for large cities or decentralized areas served from "health districts" or "health centers" which are in turn responsible to a central bureau of administration.

The code surely has served us well in those days when we were required to make detailed functional cost reports to those 38 cities and it has served

us as an administrative tool with bureau directors and district health officers. It is true that the code is now undergoing study for possible revision as a result of simplification of cost reports to cities made possible by a recent change in the California State Law whereby cities availing themselves of public health services from the county pay only for the services that are performed in the enforcement of local ordinances. This means that in so far as the contract cities are concerned they will require from us reports only as affecting enforcement of local ordinances and not pertaining to the various activities carried on by the health department under authority from the State Health Law.

The development of our "functional work number code" and the use of it will be interesting: Prior to 1917 the County of Los Angeles operated on a cash basis and although this means that the county did have some form of budgetary control it was not the effective control now exercised. The report of health department expenditures for 1916-17 reads simply:

Salaries	\$ 8,456.41
Other Expense	5,592.09
Outlay	340.77
	<hr/>
	\$14,389.27

The following year expenditures were \$14,506.14 for Salaries; \$7,077.12 for Other Expense; and \$1,572.80 for Outlay, or a total of \$23,156.06. This total, however, was expanded in detail to list seven functions, namely: Health Office, Administration, Conservation of Child Life, Treatment and Prevention of Communicable Disease; Food Registration and Inspection; Sanitary Inspection; and Suppression and Control of Venereal Disease. That year was really the beginning of our attempt at functional cost segregation.

In 1915 the County Health Department was housed in a single room tucked away in a relatively unused por-

tion of the erstwhile County Courthouse attic. Inasmuch as the staff consisted of but one man, Dr. J. L. Pomeroy, there were no complexities of organization. Functional cost keeping was not yet a problem. Control in communicable diseases over an area of mountain, desert, and valley covering 4,085 square miles was more than enough for one man (even if he did have a trusty or trustless Model X). Serving that large area presented problems enough without dwelling on cost accounting. Reports indicate that a considerable showing was made during that year and that the Board of Supervisors allowed the Health Department \$15,000 and augmented the force to include one inspector and one nurse.

As mentioned, budget control was installed in 1917 and the Health Department, still growing, was awarded about \$18,000. By 1919 effective demonstrations had been made, notably in the suppression of a typhoid epidemic, and those sound practices inaugurated by Dr. J. L. Pomeroy resulted in the signing of contracts for public health by two cities, namely, Pomona and La Verne. By 1922 Glendora, El Segundo, and El Monte sought contracts. The following year Alhambra, Hawthorne, Monrovia, and Whittier signed contracts. In 1927, 26 cities were under contract and the following year 6 more were served. In something like 12 years the department had grown from a budget appropriation of approximately \$15,000 to approximately \$1,000,000.

To cope with rapidly increasing needs for the accumulation of definite statistical data which were required for administrative purposes for reports to contract cities and for state and federal agencies, mechanical tabulations of information on births, deaths, morbidity, inspections, home visits, etc., were provided with the introduction of a punch card, mechanical sorter, and tabulator, and when the various Mayors and City

Councilmen became cost conscious, as a result of changing contract rates, clauses were inserted in the contracts requiring periodic functional cost reports as well as statistical reports covering the various activities within their respective boundaries. Naturally, the cities were interested in seeing just how much service they were paying for, and exactly what those services cost.

The punch card system was then extended to take care of the recording of time and mileage on the same card that was used to collect statistical data. This work number code, devised by Dr. Pomeroy, was put into use and with modification or addition has been in service for more than 10 years. The value of the accumulation of functional cost data is exemplified in that such functional cost data served the department at periodic contract periods to increase the revenue of the health department from such contract cities and specifically that revenue was increased during the 10 year period of 1926-1936 from \$40,000 to \$102,000. This money, incidentally, did not accrue to the Health Department budget but was deposited to the credit of the County's General Fund.

The compiling of functional cost data also has served in the preparation and fortification of budget requests which have passed the scrutiny of the Department of Budget and Research, which is charged with the examination of each item requested, and enables us to present in graphic form certain data not readily obtainable otherwise. Often, we have reduced results to a single chart, and in one notable instance not so long ago a single chart played a tremendous part in "selling" a tuberculosis program.

The same cost consciousness that is manifested by the city fathers, the research workers of the Department of Budget and Research, is shared by the taxpayer-stockholder, as exemplified at

various hearings of taxpayer's associations when the budget is considered by the Board of Supervisors. The value of accumulative history of functional cost over a period of years is therefore clearly evident.

Briefly, the main headings of the functional code used are as follows:

BUREAU OF GENERAL ADMINISTRATION

10 *Health Officer*

Used by Bureau Directors and District Health Officers representing Department as a whole

11 *Executive*

11.01 Secretarial and Personnel

11.02 Business Management

11.03 Special Work Annual Reports

11.04 Research Work

All administrative research assigned by Health Officer or Business Manager

12 *Accounting*

12.01 Accounts

12.02 Records and Statistics

12.03 Unit Costs—Population data, etc.
Cost Section

13 *General Popular Health Information*

13.01 Press Work

13.02 Health News and Bulletins

13.03 Motion Pictures

13.04 Exhibits and Demonstrations

13.05 Lectures and Talks

14 *Employee Training*

15. *Vital Statistics*

18 *Maintenance*

18.01 Storeroom

18.02 Delivery Service

18.03 Special Assignment

18.04 Salvage

18.05 Service of Repair

18.06 Ditto Copy Work

18.07 Mimeograph Copy Work

Medical & Social Service, Maternal & Child Hygiene, Sanitation, Communicable Disease Control, Laboratories, etc., all have their major code numbers with sub-numbers covering such other breakdowns as it was deemed advisable to make.

As to material and supplies, the County Health Department added in 1932 a classification of supplies for material control ledger and code numbers

were assigned to the various items used by the department. This classification was also used through the operation of the mechanical tabulating equipment. Perpetual inventory figures are readily accessible and assure the reasonably prompt preparation of reports as needed. Further, we know at all times the actual money value of our store stock.

The punch card system has been decidedly useful in the accumulation of billing data in conjunction with inter-departmental services to other departments. These services amounted to over \$56,000 during the fiscal year just ended, which accruals are deposited with the County Treasurer and not to the credit of the Health Department Fund. Under the existing arrangement the County Health Department acts as custodian for several county buildings in which others beside the County Health Department offices are located and detailed billing information available to the various departments served must be maintained.

Any license or tax fees collected as a result of public health services do not accrue to the Health Department Fund but are deposited with the County Treasurer as miscellaneous receipts and accrue to the General Fund of the County. As to the cost of cost accounting, particularly with municipal, county, or state departments, it is clearly evident that no definite comparison with other cities, other counties, or other states can be made when we take into consideration the fact that one city may be able to operate under a very liberal setup which permits expediting the handling of claims whereas other cities or counties are definitely held by rigid charter provisions put into force under conditions less modern than the present and continuing with the ramification of detail which cannot be eliminated except by revision of charter provisions or changes in rules ordinances which govern in certain cities and counties.

We do not propose to answer the possible question as to whether or not a punch card system of mechanical tabulation is entirely practical for a health department, considering mechanical tabulating and sorting for functional cost data alone. Volume can best determine that. For statistical tabulations, however, the mechanical setup provides unquestionable flexibility. Our own volume of statistical data required is such that we believe we have reached the bottleneck point where, in order to render coincidental reports on cost and statistics, we must either enlarge our present mechanical setup to permit more epidemiological studies, more spot checks, more studies of birth and death records, more complete information on tuberculosis, and more

statistical information on venereal disease control, or use our present equipment entirely for statistical purposes. With the assistance of the County Auditor, we are experimenting with a system which indicates a promise to liberate mechanical tabulating time to statistical information and to separate time and mileage from such statistical reports. We are not prepared to make a prognosis and the next few months probably will tell the story.

In conclusion, we should like to stress again the point that a concerted effort is needed to bring about the standardization of functional terms used in connection with public health departments and thus so clarify the situation as to make comparisons truly possible.

DISCUSSION

HENRY F. VAUGHAN, DR.P.H., F.A.P.H.A.

Health Commissioner, Detroit, Mich.

DR. POMEROY, Mr. Messier, and their associates at the Los Angeles County Health Department have built up a very excellent means of cost accounting. It seems obvious that the establishment of such a service is of value in the reallocation of costs to various localities which purchase their public health service from a central organization. There should be an increasing tendency for suburban communities either to pool their health work through a common agency, county or district, or purchase the same from some nearby urban center. In either event the need of reapportionment of costs is evident.

In Los Angeles County both the extensive area involved and the multiplicity of organized communities warrant the adoption of the plan whereby the services are pooled under the

auspices of a county unit. In suburban communities which cluster about a large metropolis the control of milk, food, sanitation, and even communicable diseases by the city may serve to a liberal extent the needs of the surrounding territory. Surely, it would not be unfair to apportion some of this cost back to the suburban taxpayers. To do so requires the installation of a cost accounting system.

In the sanitating of food, milk, and other beverages a health department provides service not only for the consuming public but also for the industries, food handling establishments, pasteurizing plants, and packing houses concerned with such problem. In apportioning the cost of inspection the broad attitude may be taken that the suppression of disease is in the interest of the public good. The cost must in

the final analysis be borne by the public. The actual bill for the service may, however, be presented to the consumer either as a taxpaying citizen or through his milk and meat bill. We, personally, feel that from the administrative viewpoint of the health department there is some advantage in establishing licensing fees sufficiently high to meet a good share of the inspectorial expense. After all, the practical health administrator knows that there is a reasonable limit beyond which public funds will not be appropriated for the health department. It behooves us then to use our ingenuity in transferring from our tax budget to some other source those expenses which can be reasonably borne elsewhere.

There are many activities which have a complete or partial health significance which can be shared with other city departments or with industry and business. Plumbing and smoke inspection, as well as traffic control, all have their health significance, but if we can impose upon a building department and police department the expense involved in engaging the services of inspectors and policemen, it reserves to the health department, funds with which to employ nurses and health educators. We must conduct our health programs with maximum service in adventures which contribute most directly to reductions in death rate, prolongation of human life, and an increased fullness and wholesomeness of man's existence. In sharing with others, by the official or

nonofficial, public or individual agencies, we need some reasonable form of cost accounting. The consumer, the businessman, and the public demand this type of bookkeeping.

Financial interpretation of health procedures affords also an opportunity for the alert health officer to compare his own program in point of time and that of others in both time and place. As the years roll by we should be interested in knowing whether our departments are becoming more efficient and whether the cost of a nursing visit or an inspection is going up or down. If it is too high in light of previous years or too high when compared with similar conditions in some other city or county, let this serve as a warning note that the service needs investigation. The whole process should serve toward the more efficient conduct of public affairs.

Finally, let us not forget that the modern health department is built upon public confidence, that the citizens support a health department because of their personal interest in the avoidance of conditions which are inimical to health. Public funds would soon dry up and health departments would be stranded were it not for some systematic reporting to the taxpayer of the value received from the tax dollar. Those who have taken an interest in this type of health bookkeeping are to be congratulated. Let us hope that their example will be followed by many others.

Essentials of Budgeting*

WALTER N. KIRKMAN

*Chief, Division of Personnel and Accounts, State Department
of Health, Baltimore, Md.*

ACTIVITIES of health departments are expanding rapidly, in consequence of popular demand and increased appropriations. Almost universally, appropriations are requested in budget form, and accounting procedures are based on the accountability of funds allotted under budgets. The budget record is probably the one form which is used in common by all health departments, large and small, and operating in states, counties, and cities. So the budget is the most important financial document in the department. And, since all activities cost money and, therefore, have a financial basis, it can be said that the budget is one of the most important instruments in the entire department. It is timely, therefore, that at this meeting of the Health Officers Section, where business administration subjects are discussed for the first time, that "The Budget" should be given prior consideration.

The subject will be developed under the 4 following general heads:

1. Budget Planning
2. Budget Building
3. Budget Accounting
4. Budget Control

BUDGET PLANNING

Budget making begins with *planning*. The *financial* budget is the device for making effective the *work* budget. The budget is the *effect* not the cause.

* Read before the Health Officers Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

Budget making time should be an inventory taking time. Existing activities should be critically reviewed and evaluated. Results should be compared with costs, and determination made for contraction, continuation on the same basis or expansion of existing activities. Constant repetition of duties is apt to establish their necessity in the minds of the workers. Just because something has always been done is no reason, *per se*, for its continuance. A tradition may become sacred solely by reason of its age. It is desirable, therefore, that the public health administrator critically examine the activities of his department at budget making time, and seek continued support of only those which have made definite contribution to the main objectives of public health work. Having made this important determination, it then becomes necessary to consider the extent, if any, to which present activities should be extended and what new activities should be inaugurated. Pressure for new activities in public health work frequently originates from the lay public and careful consideration should be given to such suggested projects, to determine their soundness as governmental procedures and their position or relation to functional units in the organization. Of course, new activities will also be suggested by our own experience or that of others, and by scientific research and discoveries.

In this connection I quote from an article by Dr. C. E. Waller, Assistant

Surgeon General, U. S. Public Health Service.¹

Sound planning is essential to the success of any public health undertaking. It is unscientific and wasteful to attempt the setting up of facilities for health work without first determining what the most important needs of the community may be, and how each dollar available to the health organization may be expended in such manner that the greatest possible return on the investment may be obtained. Too often the development of administrative machinery and procedure has simply followed the lines of a pattern borrowed from some other community, or, even worse, has been based upon expediency. Any plan designed to meet the health needs of a particular state, city, or county should be formulated only after careful study has been given to all available data relating to local health conditions, including morbidity and mortality records, and after the most important problems have been determined. It is well to bear in mind, in this connection that some of the activities usually carried on by health departments, while popular, and desirable from the esthetic standpoint may be relatively of little value in actually preventing disease. When funds are limited, the facilities required to meet the most important needs from the standpoint of reducing preventable illness and mortality should come first; after these have been provided, other activities may be undertaken, but the public should be informed very frankly that some of them are desirable chiefly for esthetic reasons or for the sake of comfort, and play only a small part in protection of the public health. Such activities should be afforded to the extent that the people are willing to pay for them after funds have been made available to meet the real and urgent public health needs of the community.

We must also consider, in selecting health activities to be supported with public funds, the question as to whether the proposed expenditure for a given project is sound from an economic standpoint. It is conceivable that in some communities the performance of certain functions, admittedly of some value in preventing disease, might not be economically profitable because of the relative unimportance of the problem and, consequently, the relatively small return for the expenditure. Those of us who have the responsibility for the administration of public funds should have the courage to face the facts and to be fair with the public.

Determination having been made concerning our activities or *work* budget for the ensuing period, it then becomes necessary to support that program with a *financial* budget.

This leads us to a consideration of the second phase of budget making, namely, budget building.

BUDGET BUILDING

In compiling the budget, it is necessary, of course, to follow the form provided for all agencies of that government of which the health department is a part.

The form varies in the several states, counties, and cities. This renders somewhat difficult the comparison of health department budgets. It may be possible for this group to work toward a standardized terminology of items so that health department budgets can be more accurately compared. In many of the states, counties, and cities using the budget system, a standard classification of expenditures has been adopted. This differs considerably in the various political units, some classifications being very detailed, others comparatively simple. In general it is believed the system described below fairly meets the needs. Only that part of the classification relating to health department operation is discussed. The plan is effective in several of the states, and has stood the test of usage over a period of several years. Under this plan the classifications governing the preparation of the budget require the estimates to be furnished under the two general classifications: by character of expenditure; by object of expenditure.

Classification by character of expenditure means the division of the estimates in the budget so as to distinguish between current expenses, or those which are incident to operation, and those which are capital outlays. Requests for funds for each activity

are made under one or the other of two heads—"expenses of operation" or "capital outlays."

"Expenses of operation" embrace all items of expenditure necessarily incurred for current administration, operation and maintenance, and those for materials and equipment in the nature of repairs or replacements which do not add to capital assets.

"Capital outlays" comprise expenditures of every character which increase capital assets by additions or betterments. Extensive or extraordinary repairs and replacements in kind do not constitute "capital outlays" where no change has been effected in the kind of equipment, or structure.

Following the primary separation of the estimates for each distinct activity into "expenses of operation" and "capital outlays," the items which fall under each head are arranged by *object* of expenditure—or, to express it differently, by kind of things purchased—in accordance with the following general classification, which is uniform for all activities.

EXPENSES OF OPERATION

A. Personal Service

Personal service is direct labor of persons.

Salaries

Salaries to include compensation of all regular officers and employees who are paid at a weekly, monthly or yearly rate.

Wages

Wages to include compensation of all regular employees who are paid at an hourly or daily rate.

Special Payments

Special payments to include all fees paid for special services.

B. Supplies

Supplies are commodities of a consumable nature which show a material change in, or an appreciable impairment of, their physical condition through use; and instruments and tools which have a limited period of use and are liable to loss, theft, and rapid depreciation.

Operating Expenses

Fuel supplies

Office supplies and stationery

Printing

Medical and surgical supplies

Laboratory supplies

Household, laundry, and cleaning supplies

Motor vehicle supplies and operation

Books and periodicals

Engineering supplies

Vaccines and antitoxins

V. D. Clinic supplies

Other supplies

C. Repairs and Replacements

Includes the cost of labor and services of other than employees, materials, use of equipment, etc., all of which may be necessary to maintain in kind equipment and property.

D. Other Expenses of Operation

Light, heat, power, and water

Traveling

Transportation of commodities

Communication — telephone, telegraph, postage, etc.

Insurance

Other Expenses

E. Capital Outlays: Betterments

Equipment, land and structures (additions)

Equipment, consists of machinery, implements, tools, furniture, live stock, vehicles and other apparatus that may be used repeatedly without material impairment of their physical condition and which have a calculable period of service, including additions or betterments to existing equipment.

According to A. E. Buck in his book *Public Budgeting*²:

The systematic classification of governmental expenditures and income is a recent achievement in this country. Perhaps the first comprehensive attempt at any such classification was that made by the U. S. Bureau of the Census when it began the collection and publication of the Financial Statistics of Cities under an act of Congress which was passed March 6, 1902. Under this classification, expenditures were grouped on both functional and character bases and income (revenue) was arranged according to sources. The same types of classification were applied to the Financial Statistics of States when this series was started by the Bureau of the Census in 1915.

The next important development in classification came as a result of the work of the New York Bureau of Municipal Research in connection with the installation of budgetary procedure in New York City. This work began in the city department of health in 1908, and during the subsequent five or six years practically all the departments and

agencies of the city government were studied. The proposals for classification were confined to expenditures. At first, the emphasis was placed on a functional classification within departments supplemented by an object classification. Within a short time, however, the emphasis was shifted to the object basis. The reason for this, as later explained, was that classification by object lends itself to standardization of accounting procedure, while grouping on the basis of function seems to increase the difficulties, inasmuch as the functions must differ in every department. Accountants naturally preferred the form of classification that promised greater uniformity and order in the account. It was possible to standardize the classification by objects but not the functional one. Besides, appropriations by functions would leave the door open for the misuse of funds, unless supported by an intricate system of accounts; while appropriations by objects would apparently check this practice, which was regarded as one of the most trying evils of that period. For these reasons the functional classification was gradually subordinated and the classification by objects became the primary one in all the city departments by 1912.

Having decided on the *work* budget and drawn the pattern for the *financial* budget, it now becomes necessary to determine the amounts to be asked for in the various items. In the personal service division of the budget, the amounts asked for individual salaries should again be the result of careful planning. It is presumed that job studies have been made from time to time to determine, among other things, the load and the production per worker, and the relationship of the duties to be performed. Useful also, is some device or measure to determine and record the efficiency of employees in their respective jobs. With this information and background, it is now possible to fix the amounts of individual salaries. Involved in all this, of course, are certain aspects of personnel administration, and it is to be presumed that in the selection of employees, job classifications have been established, and duties of each position and qualifications of persons holding the same have been defined. It is also to be presumed

that proper tests have been applied to individuals seeking employment to determine their fitness. If the department operates under civil service, these procedures almost surely will be in effect. In this connection, it can be said that while there are some objections to the operation of civil service systems, particularly in the employment of professional and technical personnel, the desirable features distinctly outweigh the undesirable ones. Security of employment enlists the interest of qualified personnel, and emphasis is placed on job classification, definition of duties and qualifications, and orderly and impartial testing of applicants for positions to determine their fitness. This makes for good personnel administration.

Budget building will be greatly simplified if there is in effect a standardized scale of salaries. Like salaries should be paid for like duties and *performance*. It is desirable to have a range in each classification, and, generally speaking, new employees should enter the service at the minimum rate and be advanced as their efficiency increases.

It is customary to have a differential of from 20 per cent to 30 per cent between minimum and maximum salaries within the various classifications, and to establish yearly increments so that the maximum is reached in five years. Some salary standardization plans provide an additional amount above the maximum as a bonus, for extraordinary or unusually efficient service.

All of these features of good personnel administration can be adopted by any department, irrespective of whether or not the political unit under which it operates uses the merit system.

With these administrative procedures in effect, the fixing of the amounts of the individual salaries in the budget becomes a simple matter. It is for this reason that it can be said that

the salary budget is the result of an orderly and planned approach to the important matter of compensation. We are dependent upon others to do the routine work of our departments. Good morale is not only important in the successful conduct of any organization, it is absolutely necessary. The payment of fair and just compensation in turn has a large effect on morale. Just as important is provision for a retirement system to insure some degree of economic security to those who have devoted their lives to this essential branch of public service. Public employees are of course exempt under the provisions of the Social Security Act, relating to Old Age Pensions, so it behooves us to work for the establishment of pension systems in our own political units.

In determining the amounts of the various expense items, both the past and the future must be explored. The past for experience in the consumption of the quantities of commodities or use of services which we have purchased. In this connection it is presumed that records of use of commodities have been maintained as an index of future consumption. Proper weight must, of course, be given to expected increase or decrease in consumption or use. Consumption and use having been determined it then becomes necessary to estimate the cost. Here we must explore the future, and forecast market conditions from past and present price trends, and other economic factors which affect the price structure.

Having fixed the individual budget items it is now possible to total salaries, to total expenses, and arrive at a grand total. These sub-totals should be critically reviewed for their relationship to each other and to the grand total; for there is a relationship between total salaries and total expenses and the grand total. For example, in Maryland we have found that total salaries should

not exceed 74 per cent of the total budget and should not be less than 70 per cent. If too large a sum is set aside for personnel services we will have workers but no tools; if too large a sum is provided for expenses, we will have tools but no workers. So, it is necessary to keep the two main divisions of the budget in proper balance. This percentage relationship will be constant only for each political unit, and must be worked out by each department for its own use. State departments because of the large area in which they work, need a larger amount for expenses, particularly travel and communication, than counties and cities. Costs and convenience of travel and degree of decentralization of field work are other factors which affect the percentage relationship of budget subdivisions. This test should be applied to the budget sub-totals and adjustments made if necessary.

It is interesting to observe that 28 states report the relationship of sub-totals for salaries and expenses to total budget to range from

35%	for salaries and
65%	" expenses
<hr/>	
100%	
	to
81%	for salaries and
19%	" expenses
<hr/>	
100%	
The average for salaries is 61%	
and for expenses is 39%	

Seventeen of the larger cities report salaries totaling from

36%	for salaries and
64%	" expenses
<hr/>	
100%	
	to
92%	for salaries and
8%	" expenses
<hr/>	
100%	
The average for salaries is 77%	
and for expenses is 23%	

Because of varying conditions and factors perhaps not much significance can be attached to these average figures.

The budget having now been completed and all the tests for a balanced document applied, it becomes necessary to prepare for its explanation and justification before budget making and appropriating authorities. In no one particular perhaps is the result of careful planning and proper building technic so forcibly illustrated as in the presentation of the budget. A haphazard or poorly organized affair is sure to bring discredit on the department, and little consideration from the authorities. By the same processes of planning and building we should be able to justify our budget to fiscal officers. Nothing so far has been said about cost accounting because that is the subject of another paper for presentation at this session. It is highly desirable to be familiar with the unit costs of operation, at least of the various functional units. If unit costs have in addition been developed for individual activities or processes, that information can be used to good advantage to justify the budget to fiscal and appropriating authorities.

BUDGET ACCOUNTING

We assume now that the budget has had the approval of budget making officials, has successfully run the gauntlet of appropriating authorities, and the funds are available. Activities of the department are proceeding and money is being expended. It now becomes necessary to account properly for such expenditures. It is not within the scope of this paper to describe complete accounting systems for health departments. But if funds are made available under a budget it is obviously necessary that a budgetary record be maintained. This is one of the accounting forms which doubtless all health depart-

ments operating under the budget system have in common.

A satisfactory form provides for the recording of encumbrances, expenditures, accretions in way of appropriated receipts, and, of course, shows the amount, account number, and title of the budget item. One sheet is used for every item. Accumulative totals of receipts are shown and accumulated expenditures and encumbrances, and finally net balances after each transaction.

This form can be used in connection with hand or machine bookkeeping. Appropriations are authorizations to spend, and this form provides a complete record of expenditures bringing together all the necessary information, including accretions to the various items, and showing unexpended and unobligated balances after every transaction.

Budgets must necessarily be prepared some time in advance of their date of operation and it is impossible to forecast exactly the correct amount of every item. As the budget period proceeds, some items will carry surpluses, others will indicate deficits. This is especially true of budgets for health departments, where unpredictable outbreaks of disease may throw the most carefully planned budget out of joint.

Provisions must therefore be made to amend the budget by adjustments between surpluses and deficits, in order to balance at the end of the period. Practice, of course, differs in various political units, and the procedure in effect must be followed. The important point is that flexibility in budgets must be provided if funds are to be used to the best advantage. It is also desirable to have a contingent fund, under outside official control if necessary, which will be available to meet actual emergencies, especially those arising from unusual outbreaks of disease. This fund

can be sufficiently safeguarded to prevent the possibility of the money being used except in absolute emergencies.

BUDGET CONTROL

As budget items are authorizations to spend, by that very factor expenditures must be limited to the amounts of the items. So that the budget appropriations become at once authority and restriction. Penalties are usually provided for over-expenditures, so it becomes necessary for the administrator to establish the machinery for control of expenditures. Without this device, the financial situation would soon become chaotic. Functional units should be allotted their own budgets; and obligations and disbursements carefully recorded against every item, so that

rates of expenditure can be observed. Rates of expenditure have some importance but are not necessarily controlling. Seasonal activities, forward purchases of supplies in favorable markets, and other factors disjoint the rate of expenditure from the theoretical 1/12 of the annual appropriation per month. These disjointed rates however, tend to flatten out over a period of months, so that the trend of the rate can be established. By such safeguards, it should be possible to balance activities against resources and reach the end of the budgetary period with accounts balanced.

REFERENCES

1. Waller, C. E. The Layman's Part in the Federal Health Program. *Health Officer*, July-Aug., 1938, pp. 78-79.
2. Buck, A. E. *Public Budgeting*, pp. 177-178.

DISCUSSION

CLIFFORD C. SHORO

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MR. Kirkman has made it perfectly plain to all of us that there are two important preliminary steps to the completed budget. First "Budget Planning" and second "Budget Building." Then he carries his scheme to third, "Budget Accounting" and fourth, "Budget Control," and there he stops, and I am glad because he has so completely covered the subject that there is not much left for me to talk about. I might comment on the order in which he has placed the four sub-headings into which he divided the subject, because it seems to me that "Budget Control" might precede "Budget Accounting."

But I really do believe that there is one important phase of "Essentials of Budgeting" that he has not brought out.

I mean the philosophy of the fiscal officer in preparing his budget for submission to the appropriating authority.

You know that a *budget* is actually a financial plan of a governmental unit which covers not only appropriations to be requested but also ways of financing such proposed expenditures. Or, in other words, a budget is a plan of expenditures and income.

My philosophy of budget making can be summed up to this, "Budget only such items and in such amounts as can be defended before any individual, group, or committee by factual data." I have found that different methods are employed by health department and hospital officials in presenting their plans and budgets for consideration. However, I can safely say that all methods used can be classified under two

headings (1) the true or honest budget that can be defended to the last detail, and (2) the inflated or padded budget.

First, let me discuss the latter method of budgeting. Some officials feel that their budget must be prepared in such a way and in such amounts as will give room or opportunity for the appropriating authority to cut and slash and still provide sufficient funds on which to operate. They feel that this is the only safe method to use as it provides an opportunity for the official charged with the duty of making or recommending appropriations, be it the governor or legislature of a state, the mayor or board of aldermen of a city, or the board of supervisors of a county, to publish the budgets submitted as compared with the appropriations made or recommended calling particular attention to the savings made to the taxpayer.

I do not agree with this method.

I believe that the inclusion of "velvet" in a budget is sure to be detected and will result in the entire budget being viewed with suspicion and distrust. Such a budget is sure to be reduced and the fact that some items and amounts are absolutely necessary and essential will not deter the appropriating authority from arbitrarily reducing the entire budget.

I will stake my chances on a true and honest budget but will not jeopardize the operation of our department by the submission of an inflated budget.

If a new activity is worthy of consideration then it is worthy of sufficient study and planning so that a request for an appropriation with which to implement such activity can be properly defended and not subject to reduction on account of poorly estimated costs. If estimates of costs of maintaining a service or activity are carefully made and can be backed up with factual data or, in the absence of actual facts, can be reasonably and honestly com-

pared with data of a comparable activity already under operation, then the decision to be reached before an appropriation is made can be based on only one consideration, namely, is it a necessary or essential activity which the governmental unit should undertake for the benefit of its citizens.

If it is proposed to extend or enlarge an activity already in operation then it becomes a comparatively simple matter first to determine the extent or volume of work to be done or services to be rendered and by comparison with the activity already under operation to determine the cost of the enlarged program.

We have considered the two opposite methods of preparing budgets for consideration.

There are other types of budgets that are submitted, possibly less frequently, but yet we do see them occasionally.

Take for instance a plan or program submitted by a division to be included in the departmental budget. Invariably the greatest amount of detail is given to explanation of the needs for the activity and the personnel with which to carry it on. If it is a field activity the plan will include the necessary field personnel, automobiles for transportation, items of maintenance and operation of cars, and hotel and other expenses of travel, and statistical, stenographic and clerical assistants in the office; but I wonder how many fiscal officers in checking such a plan have found that nothing has been included for the purchase of office furniture, typewriters, filing cases, etc. I once saw a budget that had been prepared calling for the expenditure of over \$100,000 and in listing the personnel required, not one single position had been included to do the necessary auditing and accounting of this fund.

In his treatment of the subject under discussion, Mr. Kirkman has included Budget Accounting and Budget Control

as equally important as Budget Planning and Budget Building. In this I fully concur. It is accepted that the planning of the budget is the prerogative of the Chief Medical Officer. However, the building, control, and accounting of a budget should be the duty and responsibility of the fiscal officer, which brings me to the point that I want to make in connection with the relation between the chief health officer and his fiscal officer. Possibly this has no place in this discussion, but I have cited two examples of incomplete budgets simply to give me an opportunity to stress the fact that your fiscal officer should have as important a place in your official family as any other division head.

His should be the responsibility for the execution of a complete budget. His should be the authority for the proper and economical expenditure of all funds appropriated for the department for expenses of operation and his the responsibility for budget accounting. No budget should be prepared and submitted as a request for appropriations that has not been built by the fiscal officer on plans laid by the chief medical officer.

Likewise, no orders for the expenditure of funds appropriated under any

of the several headings of Expenses of Operation should be issued by any department official other than the fiscal officer. Only in this way can the financial affairs of a health unit be properly conducted.

As an indication that health officers are coming to realize the assistance that a well trained fiscal officer would be to them I call your attention to what some speakers have said earlier in the week.

Dr. Mosher recommended the delegation of administrative authority by the health officers. Dr. Mountin called our attention to the average tenure of office of the health officer. Dr. Waller pointed out the probability of increase in federal appropriations and allotments to states for general public health work and for specific purposes. This had reference to the program that Dr. Parran so thoroughly explained. Dr. Bass said that a doctor has the reputation of being a poor business man. Dr. Williams made this statement: "fortunate indeed is the health officer who has a strong financial and budgeting secretary." Dr. Amyot in connection with his recommendation of a committee on finance, budgets, and business administration referred to it as the "life blood of the organization."

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WILLIAM HALLOCK PARK

THE death of Dr. Park on April 6 breaks one of the last remaining links with the Golden Age of Bacteriology. His 76 years spanned the entire history of the modern public health movement; and his personal experience, as the organizer of the first municipal diagnostic laboratory in the United States and as its active head from 1893 to 1936, is a unique record of achievement.

Dr. Park was born in 1863 and graduated from the college of the City of New York, taking his medical degree at Columbia in 1886. He studied at Vienna and began general practice in New York; but he brought with him from abroad the new vision of bacteriology and began, under Dr. T. M. Prudden's leadership, to experiment with the bacteriological diagnosis of diphtheria. Dr. Hermann M. Biggs, who had recently been appointed Chief of the Division of Pathology, Bacteriology, and Disinfection in the city Department of Health invited the youthful investigator to organize his projected laboratory. Park began service on May 4, 1893; and by the end of that calendar year he was able to make one of the most remarkable reports in the history of bacteriology. His first 8 months of study demonstrated: (1) the validity of the culture test as the only reliable criteria for the diagnosis of diphtheria; (2) the persistence of virulent diphtheria bacilli in the throats of convalescents; and (3) the importance of the well carrier in the transmission of this disease. The value of the latter contribution to the development of our understanding of the importance of the carrier state has never been appreciated at its full value.

During the next 4 years, Park and Biggs employed diphtheria antitoxin for the first time—on a large scale—for the treatment of diphtheria and completed the first statistical demonstration of its incalculable value. Later on, when active immunization against this disease became a possibility, it was again Park who took the lead in the development of toxin-antitoxin. His intimate connection with this field is indicated by the fact that our standard organism in all diphtheria studies is still "Park No. 8"; and it was truly said that Dr. Park

"contributed more than any other living man to the development of bacteriological diagnosis and serum treatment which has made possible the conquest of diphtheria."

Yet Dr. Park was no "one-disease man." In connection with the immunological prophylaxis or treatment of scarlet fever, of pneumonia, of tuberculosis, of pertussis, of meningitis, of poliomyelitis, his achievements are embedded in the permanent literature of medical science; and he played a notable part in the introduction of immunization by the use of convalescent serum in measles and other infections.

In the wider field of public health, Park conducted (with Dr. Emmett Holt) one of the first studies of the relation of milk to infant diarrhea. He added greatly to our knowledge of human infections with the bovine tuberculosis bacillus; and he was the outstanding figure in the development of methods for the bacteriological control of municipal milk supplies.

Dr. Park received well deserved honorary degrees from New York University, Queen's University, and Yale. He served as Professor of Bacteriology at University and Bellevue Hospitals and at the Medical College of New York University, and in 1933 was appointed as Hermann M. Biggs Professor of Preventive Medicine at the New York University and Bellevue Hospital Medical College. His texts, *Pathogenic Microorganisms* and *Public Health and Hygiene* have made his influence as a teacher nation-wide. Among the honors showered upon him have been the presidency of the American Public Health Association, the Society of American Bacteriologists and the Society of Experimental Pathologists. He received the Sedgwick Memorial Medal of the American Public Health Association, the Kober medal of the Association of American Physicians, the Public Welfare medal of the National Academy of Sciences, and the Townsend Harris medal from the College of the City of New York.

To attendants at the annual meetings of the A.P.H.A., Dr. Park was much more than a great figure in the history of bacteriology. To his staff in New York City, he was an inspiring, loyal, and affectionate chief. To many more of us, he was a wise critic, a sane counsellor, a modest, genial friend. We can agree with the citation made in connection with his honorary degree at Yale that here was "the perfect type of the scientist in the service of the State."

REVISING HISTORY

ONE of the most dramatic instances in medical history was the conquest of puerperal fever. Nothing arouses people more than such a terrible death rate as used to occur in childbirth—an entirely normal and physiological function of life. America was the scene of one of the bitterest controversies in which one party forgot the amenities of life. The other party to the controversy gave a "soft" answer in saying, "No man makes a quarrel with me over the counterpane that covers a mother, with her new-born infant at her breast." To Oliver Wendell Holmes we in America are accustomed to giving credit for the discovery that puerperal fever was a contagious disease and his article published in April, 1843, is one of the classics of medical literature. He said: "The disease known as Puerperal Fever is so far contagious as to be frequently carried from patient to patient by physicians and nurses." In Europe credit for the

discovery is usually given to Semmelweis. It is perfectly true that Semmelweis made observations and devised a system of prevention of childbed fever which was markedly successful. In May, 1847, he used "chlorina liquida" to wash his hands and required all of his students to do the same.

Now we have a story from Budapest* which seems to be thoroughly authenticated. In 1923, Professor Hauch, of the University in Copenhagen, claimed that the discoverer of the cause of puerperal fever was Pehr Gustav Cederschjöld. Professor Györy, of the Department of Medical History, University of Budapest, resolved to defend the claim of Semmelweis and undertook an extensive study which has ended in his giving the credit to Cederschjöld, who was born in Lidboholm, Sweden, in 1782. In 1817 he was appointed extraordinary professor of obstetrics and adjunct of the lying-in hospital Allmänna Barnbördshuset, founded in 1775.

Puerperal fever was common in the 18th and 19th centuries in the Scandinavian countries. At Allmänna Barnbördshuset the mortality for the first 2 years was 2 per cent while in 1777 it jumped to 19 per cent, though a new building had been moved into, and after that the disease was constantly present in the Institute. Cederschjöld pointed out that the fever was capable of assuming lasting epidemic character in large lying-in hospitals. He thought it was spread through the air by means of a volatile agent. He described the disease as assuming the picture of putrescence of the womb, but believed that the contagion clung to the nurse who carried it to healthy mothers on whom the same sponge or towel was used. He told of having seen almost all puerperal women treated by a certain midwife fall sick, so much so that he was forced to exclude her from the obstetrical wards, while the disease was practically absent from women attended by other midwives. Cederschjöld, acting on the belief that contagion was spread from the vulva, supplied every patient with a special sponge and towel. Almost immediately favorable results appeared. In 1826 he was allowed the use of three wards wholly separated from the lying-in institution, to be used exclusively for women with fever. They had separate nurses and midwives. A little later he mixed chlorine with the water with which the parts of women were washed. This account was given in 1839. Semmelweis's discovery was made in 1847.

Apparently Semmelweis did not know of Cederschjöld's work. It seems certain that Cederschjöld deserves a distinguished place in the long line of observations and studies which ended in the discovery of the cause of puerperal fever and its prevention.

According to the evidence, we must admit priority for Cederschjöld. Just as certainly, Holmes preceded Semmelweis in his understanding of the contagious character of the disease. It is evident that three great men each made a great discovery independently, and honor must be paid to each one of them for a notable service to humanity.

* Foreign Letters, Budapest, *J.A.M.A.*, Feb. 11, 1939.

GUARDING THE HEALTH OF VISITORS TO THE NEW YORK WORLD'S FAIR

THIS greatest of all World's Fairs, according to the publicity releases, is now open. It is estimated that 60 million people will visit it, including 500,000 from overseas. From every corner of the United States millions are expected

to pour in. Great numbers of people coming together act like a huge purse net bringing in any contagious diseases that may exist in the huge areas from which they come. This has been seen in fairs of this kind, in armies, and to a lesser extent in schools and colleges.

We are assured that every precaution has been taken, not only by the authorities of the Fair itself, but also by the health authorities of New York City. The City Department of Health has, in coöperation with the Fair Corporation, established a branch on the Fair grounds under the direction of Dr. John G. Grimley, Special Deputy Commissioner of Health. It is to deal with water supplies, plumbing, foods, milk supplies, the disposal of sewage, communicable diseases, and nuisances in general. Special regulations to strengthen the Sanitary Code of New York City have been passed with the special object of safeguarding the health of the vast influx of visitors. These will be carried out by a staff of 35 thoroughly trained inspectors who will daily visit the 600 eating and drinking establishments on the Fair grounds.

All food handlers are to be examined once a month and cards issued to them. No permit will be issued to any food establishment which does not meet the requirements of the World's Fair Special Sanitary Code as well as the Sanitary Code of the City of New York.

Sanitary regulations require that all glasses, crockery, and utensils used in the serving of food must be properly washed in a solution of soap, soda, or other cleansing powders and treated with a final rinse of hot water at 175° F. for a period of one minute.

Machinery has been devised for the disposal of the enormous amount of garbage which would otherwise accumulate. Specially constructed garbage trucks have been designed and each will be followed by another truck containing two tanks of 1,000 gallon capacity each carrying a cleansing fluid.

Under the Fair Corporation, Dr. J. Peter Hoguet, Medical Director of the Fair, will be in charge of a comprehensive program. Two years of study have been given to the plans and it is felt that persons may come to the Fair with every assurance of protection against disease as well as of care in the event of accident or disease. A staff of 24 doctors and 30 nurses will be in attendance constantly. The Fair personnel of more than 5,000 has been vaccinated against smallpox.

There are 7 first aid stations, each with a waiting room, rooms for the doctors and nurses, and wards for men and women. Serious cases will be hospitalized temporarily on the grounds and transferred by ambulance to outside hospitals as soon as possible. Five air conditioned ambulances will operate on the Fair grounds. There is also a truck carrying a portable X-ray equipment, and a launch with every provision for resuscitation in cases of drowning.

While it is true that these precautions are being taken largely for the benefit of the visitors, it is equally true that all health officers, nurses, inspectors, and, in fact, everyone interested in the health preservation of masses will find much of interest and instruction.

Another interesting question comes up. There are some 250,000 automobile trailers in the United States, and questionnaires indicate that between 10,000 and 12,000 will be brought to New York, many to be occupied by the owners during their visit. Of these, it seems that two-thirds expect to find facilities for parking and living within a short distance of the Fair. It therefore seems desirable that a camp adjacent to New York capable of accommodating 1,200 trailers, provided

with sewerage, baths, lights, etc., be established, since there are no large trailer camps in the vicinity of the city. The matter is engaging the attention of the authorities and the health officers of the counties adjacent to New York are studying the question and preparing to meet it. A conference of the Health Officers of the New York Metropolitan Area was held January 24, 1939, and it was the general opinion that the trailer problem might be a real one. No provision has been made up to the time of writing, but the health officers are awake to the problem and there is little doubt that it will be taken care of efficiently by the time the trailers begin to arrive in numbers.

LETTER TO THE EDITOR

TO THE EDITOR:

As a member of your important Association, I take pleasure in informing you that in collaboration with Dr. David R. Iriarte, I yesterday presented to the National Academy of Medicine an interesting work on Carate, or Mal de Pinto, indicating that for the first time in Venezuela we have found the germ which produces this disease. Its characteristics coincide with the findings of Grau and Triana in Mal de Pinto. It belongs to the Spirochaete family, Genus *treponema* of Noguchi.

The germ causing Carate or Mal de Pinto in Venezuela and Mexico is a *treponema*, very slender, measuring from 15–18 microns in length by 0.20 to 0.25 microns in width, with 12–16 rigid spirals. It has rotating movements around its major axis without propulsion, changing slowly in the dark-field, sometimes taking the form of a circle, sometimes a rod with symmetrical nodes at equal distances. In the blood-lymph obtained by scarification of the affected spots, the blue as well as the red varieties, it lives for more than 3 hours under the microscope.

Carate, according to the observations of Colombians, Mexicans, Cubans, and ourselves, can no longer be regarded as only a repulsive disease, but must now be regarded as among communicable diseases like syphilis and buba (yaws), the serological reactions of Wassermann, Kahn, etc., giving strongly positive results in 100 per cent of all active cases and in 78 per cent of those clinically cured; that is, in those whose spots have disappeared after treatment based on arsenic and liposoluble bismuth preparations.

With the discovery of the *treponema* of Grau and Triana, we believe that all of those diseases called by a variety of names in Central and South America, beginning in Mexico with the name Mal de Pinto and continuing as Cute, Carate, Carare, Catavi, etc., down to Brazil where it is called Puru-Puru, are one and the same.

With this interesting communication concerning Carate in Venezuela, I offer my highest regards.

A. L. BRICENO ROSSI, M.D.

Monroy A Misericordia 145

Caracas, February 18, 1939

PUBLIC HEALTH EDUCATION*

What the Visitor Does and Thinks—The American Museum of Health, 30 Rockefeller Plaza, New York, N. Y., is appearing to the public at the New York World's Fair. In that setting is established its initial collection of exhibits, later to be moved to the permanent home of the Museum.

The Museum has received from the Carnegie Corporation of New York a grant for an extensive study of visitor reaction during the Fair. The U. S. Public Health Service is coöperating, with Dr. Derryberry of its staff in charge of the study.

As a result of this investigation, the Museum expects to have data based on objective observations which will serve to guide its exhibit policies in the future. We hope to ascertain for instance what the average level of health information is among the public so that we may have a base on which to plan our future health education efforts.

General direction of the study is under a committee consisting of Dean Dearhorn, of New York University; Dr. Rice, Commissioner of Health, New York City; and Homer N. Calver, Secretary of the Museum. Dr. Livingston Farrand is Chairman of a General Advisory Committee.

When the Western Branch Meets—July 23–28, 1939, in Oakland, Calif., the Western Branch, A.P.H.A., will offer to—

... members who are interested in health education of the public and health education in the schools an outstanding Health Education Symposium which will take place on four separate half-days during the week. Except

for one address by an outstanding guest speaker, there will be no formal papers. The Symposium will be presided over by an authority in the field of health education. The entire group will be divided into two main sections—one devoted to school health education, the other to health education of the public. The school health education group in turn will be divided into at least three divisions—one on classroom teaching, one on school health service, and one on physical education and recreation; each of these divisions to be given ample opportunity for round-table discussion of their particular problems and presided over by an outstanding leader in this field. The group interested in health education of the public will in turn be divided into at least four divisions, each led by an outstanding authority.

Joint Health Committee Reorganized—A reorganization of The Joint Committee on Health Problems in Education of the American Medical Association and the National Education Association is announced in *The Journal of the American Medical Association* for March 25.

The general principles of the reorganized committee include that it shall be constituted of the two associations as a whole and not of any department or section of either one; that it shall include no representatives of other health agencies and shall be strictly a joint committee of the participating organizations; that it shall consist of five representatives of each organization. . . .

The principal objectives of the committee are defined as: (a) to promote a joint understanding between physicians and teachers; (b) to bring to bear on health problems in education the best thoughts in medicine and pedagogy; (c) to identify health problems in education, and endeavor to promote constructive solutions for them; (d) to seek publication of the conclusions of the committee through the columns of the periodical publications of the participating organizations whenever possible and to publish pamphlets principally as reprints when special indications for such publication exist.

* Please address questions, samples of printed matter, criticism of anything which appears herein, etc., to Evart G. Routzahn, 130 East 22nd St., New York, N. Y.

The Mayor's Message to the Aldermen—Attention Caller Ira V. Hiscock sends the text of the annual message of Mayor John W. Murphy to the New Haven Board of Aldermen.

Under "Health," the Mayor said:

Man can have no greater or better asset than good health. Therefore one of the chief and most important obligations imposed upon those in charge of municipal government is to insist that adequately trained persons shall direct the health work of the community, that they work from a sound health plan, and that sufficient funds and trained personnel be provided to make the plan effective.

New Haven has a fine Health Department, a definite health program, and the record of previous years and of the year just past is one of accomplishment and proof of its value to our people.

Then 8 points in the record are listed, and the Mayor continues:

The Health Department has many other activities designed and carried out in the interest of public health. It is a source of satisfaction to know that this is a healthy city in which to live. Therefore, we should coöperate in every way possible with our Health Department in order that conditions here may be maintained and improved.

The Doctor Looks at the Voluntary Health Agency—Under this title a group of important aspects of public health were presented at Kansas City, Public Health Education Section, by Paul A. Teschner, B.S., M.D., Assistant Director, Bureau of Health Education, American Medical Association.

Dr. Teschner said, in part:

The medical profession has always stood, and stands today, in favor of public health work and public health education of the right kind and properly directed by competent experts in their field. Such work is of value to the community in bringing about a betterment of the public health.

It is impossible to give a description of every voluntary health agency in the field. I prefer the word "voluntary" to "private" health agency, because voluntary appears to be a genuinely descriptive term for those organizations, most of which are doing a good job in a field that is not overcrowded. Since they have solicited the public for funds to

accomplish their work, they no longer have a just claim to the term "private."

The physician's conception of a voluntary health agency which he can support is an educational institution; a valuable factor in the dissemination of health knowledge; a pioneering agency breaking new ground; a research organization. This agency coöperates in bringing education to a public in search of health, and works toward greater efficiency in the prevention of disease. The prevention of disease years ago was a matter between the physician and his patient. Today, it is no longer possible for the physician singly to carry out this all-important work. Prevention of disease requires not only physicians, but biologists, laboratory workers, nurses, administrators, educators, etc.

The physician also sees the voluntary agency as a compiler of health facts as well as a disseminator of the knowledge gathered by others. To him, the agency becomes a research body as well as an educational institution. The physician looks at all three groups concerned in the public health in the following way:

1. The practising physician deals with the family and the sick individual in each family.

2. The health officer deals with a group of families—not the single families, but the group called the community. He deals with these individuals in health, not in illness.

3. The voluntary agency adopts both the individual families as well as the community family. Its concern is with special members in each family.

... Large numbers of the public have been educated to the point where it now no longer fears certain illnesses nor expects certain diseases. Rarely do we find an educated individual who expects to die of scarlet fever, typhoid fever or even tuberculosis. Due to the rapidity with which news is disseminated, it now does not require twenty years for news of a medical discovery to be given to the man in the street. The information is given to him almost as rapidly as it is compiled.

Centuries ago, the blind, the crippled and the mentally defective were abandoned to their fate. As man progressed and became more humane, the blind, the crippled and mentally defective were given custodial care which, in most instances, was inferior. Today, efforts are being made toward the prevention of these conditions and toward the rehabilitation of those individuals who suffer from any of the three. No longer is it simply custodial care, but earnest endeavors are made to restore them to as nearly normal as possible. . . .

... Even though the general public, as

exemplified by the man in the street, learns of medical discoveries almost immediately, time is still required for the value of such discoveries to become manifested. The physician wisely refuses to accept without verification the work of any one individual. He chooses to wait until that work has been proved or corroborated by other workers arriving at the same conclusions. When the work has been corroborated, then is time enough for a general acceptance of new discoveries, new methods of treatment or improvements in treatment by the medical profession.

It is here that the voluntary health agency can play its most important part. The agency can, by its special technics, interpret to the public the new discoveries and new methods of treatment for the various disease conditions. Some may hold that this is the job of the official agency. It is impossible for the official agency to go as thoroughly into such problems as can the voluntary health agency. It is impossible for the individual physician to educate the public as thoroughly as can the voluntary health agency. The voluntary agency's field is not treatment. Because of its specialization, the agency is able to do a far better job of interpreting to the public the known factors about a particular disease. By the use of special technics, by the use of funds for research, it can do a job of which the agency as well as the official health agencies and the medical profession can be proud.

For example, the individual physician cannot write to his patient and family and say, "Come in to see me next January if you are crippled from infantile paralysis," "Be sure to visit me next March for heart disease," "For tuberculosis, my office will be open to you in April," and "Come to see me in November about cancer." The voluntary agency can say to all patients of all physicians—"The time to determine whether you are free from heart disease is now," "Now is the time to see if you are safe from tuberculosis."

The agencies serve best in research by developing their special technics and by concentrating their efforts on a single problem. The practising physician and the health official cannot follow in detail all the suggestions made by all the agencies. He must choose from each organization the material that appears to him of greatest importance and usefulness for his practice or community. . . .

... Throughout the years, since the formation of each agency, physicians have supported them in matters that they deemed were in the best interest of the public health. Most of the voluntary agencies had phy-

sicians among their founders and today have physicians on their governing boards. Nevertheless, the physician still reserves the right to disagree with policies and aims which may seem to him contrary to public policy. All the physician asks is that the agencies carry out their purposes as they themselves have stated them in their articles of incorporation or organization. He asks only that the field of treatment be left where it properly belongs—in the hands of the physician trained to do so. The key-note for success for education of the public is coöperation between the medical profession, the official health agencies and the voluntary health agencies.

Instruction of Food Handlers—

Last year plans were made for giving required instruction to all persons handling food in Flint, Mich. Director H. S. Adams, Division of Food and Sanitation, Dept. of Public Health, explains the plan:

To make this instruction period more valuable and educational, a series of pictures were taken in Flint food handling establishments, depicting certain sanitary procedures and measures which are generally conceded to be of value. Two instruction periods are held each week, one on Monday afternoon, and the second on Tuesday evening. At this time a series of 12 slides are shown and an illustrated lecture given. We begin by placing emphasis on good physical health, and make mention of certain diseases that may be transmitted through food. Stress is placed upon the importance of a proper physical examination. Personal hygiene is next discussed, including the importance of personal cleanliness and hand washing, and the significance of wearing clean washable outer garments is stressed.

From personal health and hygiene, we then discuss methods used in food establishments, and pay particular attention to the sterilization of dishes, glassware, and eating utensils. Slides are shown on the proper protection of food products from contamination. Another slide, showing the interior of a modern pasteurization plant, is used, which gives opportunity to stress the importance of pasteurization and the necessity for care in handling dairy products. In conjunction with the subject of milk, a slide is used showing milk being served to a restaurant customer from the original container. In addition to the slides, we have shown a motion picture entitled "Our Common Enemy." This depicted the life cycle of the common house fly and

stressed very well the germ-carrying ability of the fly. This was in line with our food ordinance regulations, requiring that food and food products be protected from the fly nuisance.

Director Adams says further:

We believe that the illustrated lecture for food handlers, conducted routinely, as is the case here, has not been developed to the extent it deserves. We would be very pleased to learn of other departments that are working on a similar plan. From our standpoint, the results of this educational work, over this relatively short period of time, has seemed to have been very worth while.

An Exhibit in New York—Returning to New York after a 2 year 15,000 mile tour of the United States, the famous Transparent Woman, who made her debut at the New York Museum of Science and Industry in August, 1936, began a second appearance February 28 at the Museum in Rockefeller Center. The return engagement was a result of the inquiries about the unique transparent figure which have been received at the Museum ever since it left there early in 1937. An average of 200 persons a week have asked for the exhibit during the past 2 years.

The exhibit, the contribution to public health education of S. H. Camp, of Jackson, Mich., will be on view during the World's Fair, with special lecture demonstrations every hour.

RADIO

Beginning on March 4, the radio health program which has been sponsored since 1932 by the Baltimore City Health Department and the Medical and Chirurgical Faculty of Maryland changed its general nature from a 5 minute talk to a 15 minute health drama. To do this, Station WFBR and certain volunteers from the little theatre groups in the city have assisted in establishing The Baltimore Health Players.

For the 4 Saturday evenings in March a trial was made in dramatizing important "Keeping Well" messages as follows: March 4, "They've Got to Have It" (Measles); March 11, "Murder by Love" (Diphtheria Prevention); March 18, "Milk"; and March 25, "The Scarlet Scourge" (Scarlet Fever).

If the venture proves successful, it is hoped to continue The Baltimore Health Players on successive Saturday evenings at 7:30 o'clock. Topics already selected for these broadcasts include lead poisoning, maternity hygiene, pneumonia, and syphilis.

The Department of Social Welfare and Public Health, American Home Economics Association, has a committee for the Exchange of Radio Scripts. The committee now offers 14 scripts in narrative form, and 22 dialogues, most of which have to do with foods and nutrition. Borrowers pay postage both ways. For a list of scripts, write to: Pauline Murrah, Nutrition Consultant, Dept. of Health, 125 Worth St., New York, N. Y.

For facts about radio ownership and use in rural America, by states and groups of states, see "The Joint Committee Study of Rural Radio Ownership and Use in the United States." Joint Committee on Radio Research, 420 Lexington Ave., New York, N. Y., includes carefully detailed and illustrated description of the study methods.

If one wishes information about short wave educational programs, write to Station WIXAL, University Club, Boston, Mass.

Some topics from Connecticut Dept. of Health, Hartford:

The public more aware of syphilis . . . Investing in community health (public funds for health) . . . Why wait for toothache? . . . Your health and how to protect it . . . The 1939 baby (what is being done for babies).

"Your Child's Health" is the spring

theme for Homemakers Forum Radio Program, broadcast over Station WOR, and short wave via W2XJI, every Thursday, 1:45 P.M. For a program and for single copies of the talks, write to Homemaker Forum, New Jersey College of Agriculture, New Brunswick.

Says *Weekly Bulletin*, City Dept. of Health, Albany, N. Y.:

Tired of the blatant ballyhoo over the radio, a New York physician, Dr. N. Thomas Saxl, writes to the *New York Medical Week*: Why not fight fire with fire? When one listens to the daily radio programs one cannot but be impressed by the fact that a goodly percentage are sponsored by proprietary medical products. The constant repetition of "Physicians prescribe" or "Doctors advise" or "Ask your doctor" is bound ultimately to impress the laity with the veracity of such statements. Would it not be possible for the proper committee of the New York County Medical Society to note these for a period of time and then reply through the medical information bureau in one of our own medical broadcasts that these products do not have the sanction of organized medicine?

MAGAZINE ARTICLES

"Health Committees in Rayon," "Hosiery Workers Join the Anti-Syphilis Crusade," and "Milwaukee Labor Leads Fight for Medical Center" appear in the health section of "Workers' Education through Action," an issue of *Affiliated Schools Scrapbook*, 302 E. 35th St., New York, N. Y. Feb., 1939. 25 cents.

"'Incubator Rooms' Save Premature Babies' Lives." Two pages of pictures. *Life*, 330 E. 22nd St., Chicago, Ill. Mar. 13, 1939. 10 cents.

We have not seen the following, not altogether self-explanatory, topics which have appeared in *Look*, Des Moines, Ia. (10 cents a copy.):

"An Open Letter to American Doctors" (Jan. 17, 1939) . . . "Doctors Fight Back" (Jan. 31) . . . "The Fight on Syphilis" (Feb. 28) . . . "Science Studies Bad Breath" (Mar. 14).

"Why Colleges Are Teaching the Facts of Marriage," by Dr. E. R. Groves (6 pages); "These Are the Charles McMahons: Their Slum Home Is America's Housing Problem" (6 pages—how they live and what it does to them). *Look*. Apr. 25, 1939. 10 cents.

"Miners and Doctors." Editorial. *New Republic*, 40 E. 49 St., New York, N. Y. Mar. 29, 1939. 15 cents. Medical care in 4 coal producing states.

"Doctor, Here's Your Hat." *Publishers Weekly*, 62 W. 45 St., New York, N. Y. Mar. 25, 1939. 15 cents. Describes how Dr. Joseph A. Jerger has been debarred from hospitals because of his writings.

"The Logic of Coöperative Medicine," by M. Shadid. *Social Frontier*, 525 W. 120 St., New York, N. Y. March, 1939. 35 cents. "Coöperative medicine is a compromise between competitive and socialized medicine."

"Take It Easy: Dr. Jacobson Talks with Edith Gates about Relaxation." First things on an important subject. An example of interview form of presentation. *Womans Press*, 600 Lexington Ave., New York, N. Y. April, 1939. 20 cents. See it at any local Y.W.C.A.

REPORTING

"Annual Report" of Chief Medical Officer, New Brunswick, Canada, has a table of contents, that sometimes missing but always commendable feature. Unfortunately it does not mention health education.

A "different" mimeographed report is that issued by Anti-Tuberculosis League, 6101 Arcade Building, Seattle, Wash. Letter size pages; one side each leaf blank; large size cartoon characters on several pages ask significant questions—which are answered. A slightly more opaque paper would have given a better effect, and slip sheeting would have aided.

"Health in 1918 and 1938" is studied in *Birmingham's Health*, County Board of Health, Birmingham, Ala. January, 1939. Use is made of some pictographs. To us these pictorial comparisons should have been twice as large to be effective, with no increase in the size of the lettering, which now rather overshadows the accompanying pictures.

"A Million Vaccinations," and "The Threat to the Western Hemisphere," are two of the chapter headings in "A Review for 1938," Rockefeller Foundation, New York, N. Y.

"New Health Records Established in 1938," a heading in *Michigan Public Health*, State Dept. of Health, Lansing. February, 1939. Includes a high birth rate, and a low death rate.

"Fifty Years of Public Health" in Florida is celebrated in *Florida Health Notes*, State Board of Health, Jacksonville. January-February, 1939. A half page summary by each of the present bureau heads is accompanied by a photograph. Elizabeth Bohnenberger, director, speaks for Division of Health Education.

"The World Is Fairer," is the annual report of Hope Farm, New York, N. Y., a country home and school for dependent children. Title page (second cover page), and map (third page of cover), are imprinted in blue over a light background of farm scenes. Five pages carry a series of small outline sketches and brief paragraphs, each with a milestone bearing the mileage and the date of a highlight in progress of the institution.

Must Know All, Be All, Do All— Applications were invited, by April 20, 1939, by U. S. Civil Service Commission, Washington, D. C., for health education jobs with U. S. Public Health Service. The duties:

Associate Health Education Specialist— With considerable independent responsibility

in relation to a specific subject matter, to plan and execute educational campaigns pertaining to specific diseases, sanitation, and administrative problems of public health; to determine the most effective subject matter, form of presentation, media employed, and integration of such campaign with other phases of public health education and the work of other agencies in the same field; to prepare all materials to be used in connection with such educational campaigns, including articles, speeches, pamphlets, folders, bulletins, and other popular publications; to plan application of photographic and art work to layout; to prepare captions; to plan and execute ideas for exhibits for meetings of medical societies, health organizations, etc.; to prepare radio scripts suitable for a public health educational campaign; to prepare scenarios for motion picture, slide film and lantern slide use; to develop photographic and art materials to be used in connection with this program; to act as liaison between the Service and the press, the radio industry, motion picture industry, and other outside groups on matters involving problems of popular health education and the presentation of the scientific work of this Service.

*Assistant Health Education Specialist.—*To read, understand, and interpret highly technical materials of medical, public health, engineering, educational, economic and sociological character pertaining to the program of this Service, and coöperating health and medical agencies; to conduct research studies, investigations and demonstrations relating to the effectiveness of public health educational programs conducted by this Service, State and local health agencies, schools and colleges, and voluntary groups; to assist upon assignment in consultation with State and local health departments and educational authorities and school authorities on public health educational matters; to act as liaison with voluntary agencies coöperating in public health work.

The "Associate" will be paid \$3,200 a year, the "Assistant" will receive \$2,600 a year. Among the requirements:

Applicants for either position must have successfully completed a full 4 year course leading to a bachelor's degree in a college or university of recognized standing.

*Assistant Health Education Specialist—Additional Requirement—*In addition, except for the substitution provided for below, applicants for the position of Assistant Health Education Specialist must show at least 2 years of postgraduate study successfully com-

pleted toward a certificate, diploma, or a degree in Hygiene or Public Health in a college or university of recognized standing.

Substitution of Experience for Postgraduate Education—Applicants for the position of Assistant Health Education Specialist may substitute, year for year, up to a maximum of 2 years, for the prescribed postgraduate study, experience described below under "Associate Health Education Specialist." In any case at least 1 year of such substituted experience must have been in public health work.

Experience—Associate Health Education Specialist—Except for the substitution provided for below, they must show at least 3 years of experience in program building, publications, or public relations work for a recognized educational organization or agency, either governmental or private, an aggregate of 1 year of which experience must have been in public health work.

Substitution of Additional Education for Experience—Applicants may substitute, year for year, up to a maximum of 2 years for the required experience, postgraduate study toward a certificate, diploma, or degree in Hygiene or Public Health successfully completed in a college or university of recognized standing, provided that the 1 year in public health work prescribed under "Experience" above must be shown.

Nonqualifying Experience—Teaching, either adult or juvenile, or clerical or similar office experience will not in itself be regarded as qualifying.

For a full statement, address the Commission, mentioning the job titles, and U. S. Public Health Service.

IN BULLETINS OR JOURNALS

"A Challenge to Nursing Information Committees," by K. F. Young. What

to do to secure the best possible student nurses. *American Journal of Nursing*, 50 W. 50th Street, New York, N. Y. April, 1939. 35 cents.

"Communicable Diseases" is the general topic for the January–March, 1939, issue of *The Commonwealth*, Massachusetts Dept. of Health, Boston.

"Doctor Quiz" heads a column of questions and answers in *Health Briefs*, Tennessee Dept. of Public Health, Nashville. March 15, 1939.

"The Educational Possibilities of the School Lunch," by M. G. McCormick. *Journal of Home Economics*, Mills Building, Washington, D. C. April, 1939. 30 cents. Reprint, 10 cents.

National Negro Health News, U. S. Public Health Service, Washington, D. C., in October–December, 1938, reports on past and coming Negro Health Week and year round health activities.

"The Pharmacist and Public Health." *Health Bulletin*, State Dept. of Health, Richmond, Va. March, 1939. A little considered subject. For both druggist and public health worker.

"Oh, That's How It Is," by Ruth J. Larsen, lecturer on social hygiene. *State Board of Health Bulletin*, Madison, Wis. January–March, 1939. Explains how the title expresses the response of high school girls to real facts.

BOOKS AND REPORTS

Landmarks in Medicine. *Laity Lectures of the New York Academy of Medicine. Introduction by James Alexander Miller, M.D. New York: Appleton-Century, 1939. 347 pp. Price, \$2.00.*

Among the several series of "Laity Lectures" collected in volumes by the New York Academy of Medicine, this will rank among the best. It is largely historical, some of the individual lectures being entirely so, but all of them have their application to present-day problems and interests. A number of texts may be found in this latest volume which are peculiarly apt at this moment when laymen are criticising the medical profession and taking steps to interfere with the good work it is doing. For example, it is pointed out that 500 years ago the average life expectancy was only 8 years, while now it is at least 50 years more and that this marked betterment has come through the efforts of medical science which "has become perhaps the strongest force acting toward human betterment in modern civilization"; and that this modern civilization itself is built largely upon medicine.

The lecture, "Dr. Watson and Mr. Holmes," is of great interest as well as practical. It is safe to say that not many doctors know what the up-to-date coroner and the medical examiner go through in the study of crime as well as of sudden death from any cause.

Among other notable lectures is that by Raymond Pearl on "The Search for Longevity." The conclusion reached is that the "length of life is generally in inverse proportion of the rate of living." The story of more than 2,000 nonagenarians and centenarians re-

vealed that the "vast majority of these extremely longevous folk were of a placid temperament, not given to worry."

The lecture by Dr. Reginald Burbank, on Medicine and the Progress of Civilization, is a well done history of medicine, which unfortunately contains one very incomplete and erroneous statement. He says Sternberg, Laveran and Munson (sic) made it possible to eradicate malaria. Laveran was the discoverer of the malarial parasite. Sternberg introduced Laveran's findings to the profession in America. Munson, evidently intended for Manson (Sir Patrick Manson) outlined theoretically the mosquito transmission of malaria, but Ross, to whom we owe more than any other single man in this respect, with the exception of Laveran, is not even mentioned.

The book ends with an excellent chapter on X-ray by Dr. Cole, a pioneer who has constantly done much to develop the application of X-ray to diagnosis.

All the lectures here collected are excellent, and the selection of a few for special mention is no disparagement to the authors of the others. It is hard to praise the collection too highly. The printing and make-up are excellent.

MAZÛCK P. RAVENEL

The New Food, Drug, and Cosmetic Legislation. *Law and Contemporary Problems. School of Law, Duke University, Durham, N. C. Winter, 1939. 182 pp. Price, \$.75.*

State and local health officials who are concerned with the preparation or the administration of food, drug, and cosmetic legislation will find much

practical and interesting information in this bulletin. In nine articles by as many authorities there are presented excellent analyses and discussions of the new federal laws on these subjects, together with an outline of state legislation pertaining to food, drugs, and cosmetics. While some of the material is conjectural, particularly with reference to the future legal status of these acts, all of it will be of value to the student of these important problems. Here is a veritable textbook at the cost of a magazine. JAMES A. TOBEY

Annual Report of the Public Health Commissioner with the Government of India for 1936—*Government of India Press, New Delhi*, 1938. 353 pp. Vol. I with appendices.

This exhaustive report deals with both the treatment and prevention of disease in India. Descriptive material is well illustrated by charts and maps. Data are presented to show for the population of British India (282 million) a density per square mile of 321, a birth rate of 35, a death rate of 23, and an infant-mortality rate of 162. There is noted a decrease in mortality from smallpox, plague, and cholera. The number of primary vaccinations against smallpox performed (11,047,662) has increased steadily but still only reaches about half of the infants. Under preventive medicine, emphasis is given to the necessity for raising the standard of living of the Indian people, schemes of rural reconstruction being given special attention. One section is devoted to the work of research institutions including the All-India Institute of Hygiene and Public Health, and the School of Tropical Medicine.

IRA V. HISCOCK

Adventures in Living: New Ways for Old—By Thomas D. Wood, M.D., Marion O. Lerrigo, Ph.D., and Nina B.

Lamkin, A.M. New York: Thomas Nelson & Sons, 1938. 320 pp. Price, \$.88.

New Ways for Old is the sixth in a series with the general title "Adventures in Living." The authors in their preface addressed to the teacher set forth the following sound objectives as guiding principles for the whole series:

To teach health as a means to accomplishment and not as an end in itself.

To emphasize happy, healthful living, rather than the details of techniques.

To promote the growth of the whole child by activities which give him real experiences in healthful living.

To create in the mind of the child an attitude of respect for the body and its processes, and to teach about the body as a whole, rather than as a collection of anatomical systems.

To provide for healthful experiences without making the child introspectively health-conscious.

To suggest individual and coöperative projects of social value, utilizing school, home, and community experiences.

To integrate health education with other school subjects and activities.

It would seem that these aims have been pretty successfully carried out in the making of the book under review. The subjects usually included in all such school texts are here but are discussed in a rather unusual and interesting way. The attempt is made (indirectly of course) to suggest incentives for the practice of health habits—as, for example, in the unit entitled "Your Social Life." Incidentally, would not life on this footstool be transformed if some sure-fire way were discovered to teach children how to control their emotions and to enjoy the process of health habit formation?

The device of comparing school life of the early days of this country with our modern ways adds to the interest of this book. The illustrations are simple but to the point. There is a glossary and the index seems adequate.

MERRILL E. CHAMPION

The Social Work Year Book—1939—Fifth Issue—*Edited by Russell K. Kurze. New York: Russell Sage Foundation, 1939. 730 pp. Price, \$3.50.*

An anticipated and necessary addition to the reference shelf, the Fifth Issue of the 1939 Social Work Year Book promises to be even more helpful than its very useful predecessors.

Eighty-two topical articles by distinguished and knowledgeable contributors comprise Part I and provide authoritative information on welfare activities conducted on a national scale.

Part II is a state-by-state account of social work under governmental auspices.

Part III is the familiar and comprehensive Directories of Agencies in social work and related fields, national and state, public and private.

Much of the information presented in the *Social Work Year Book* is unavailable elsewhere and is nowhere available so conveniently and in such organized fashion. W. R. WALSH

The Truth About Childbirth—*By Anthony M. Ludovici. New York: Dutton, 1938. 294 pp. Price, \$2.50.*

"Lay Light on Maternal Morbidity and Mortality," the subtitle to this challenging volume, does not give a sufficient hint as to what follows. In brief the author claims that childbirth should be a normal physiological process. To this statement he will have general assent, but when he affirms that it should be not only a painless affair, moreover, a pleasurable experience, even without anaesthetics or analgesics, he is placing himself in a vulnerable position. His assertion that maternal morbidity and mortality can be reduced considerably may be accepted if we could secure the application of skilled obstetric, nursing, and hospital technics to all mothers regardless of economic circumstances.

Mr. Ludovici blames "the flight from motherhood" largely on feminism, economic conditions, and what he calls "pornocracy" *i.e.*, a state of society in which exhibitionism, smartness at all costs, cars, wireless sets, and any number of amusements without which our happier ancestors did perfectly well, are preferred before natural, simple, and satisfying pleasures for health is the first prerequisite. His solution of our present predicament would be more marriages at earlier ages, more children per marriage, hygienic living, and less meddlesome obstetrics.

It would be an injustice to the author if we did not recognize that an extensive amount of research into the socio-economic and medico-hygienic aspects of the subject had gone into the making of this book. It is thoroughly documented with references and explanatory notes. Whether we agree or disagree with the author's conclusions we will be instructed by the novel material he has introduced. It will be a stimulating but provoking book, especially to the medical profession and to ultra-modern women.

RICHARD A. BOLT

Classic Descriptions of Disease, With Biographical Sketches of the Authors—*By Ralph H. Major, M.D. Springfield, Ill.: Charles C. Thomas, 1939. 727 pp. Price, \$5.50.*

The first edition of this book appeared in 1932 and was widely welcomed. It has made available for students who do not have access to great libraries and who do not know languages most of the epoch-making discoveries in this field of medicine. The second edition has been revised and the author has taken cognizance of certain errors and omissions, some of which were pointed out by friends and those who were interested in the plan and object of the book.

The second edition includes new sec-

tions covering malaria and yellow fever. A number of the biographical sketches have been rewritten and the index has been revised and enlarged. It now contains 403 selections from the epoch-making accounts of disease of 190 pioneer authorities.

It is hard to speak too highly of the value of this book. Each selection given is "either the first known, one of the earliest, or one of the most interesting accounts of the disease in question." The selection has been done with the judgment which comes of a wide study of the classics of medical literature, by one who has an intimate knowledge of the languages involved, so much so that most of the translations have been made by the author personally. He tells in the Preface of the First Edition that Dr. Osler stressed the value of advising students to study classic accounts of disease.

At present when we are perhaps too much given to rushing after new things, it is to be hoped that such books as this will be made required reading in all medical schools. Particularly valuable to the student are the short biographical sketches of those from whose accounts selections are here given.

There are 137 illustrations, many of them being portraits, which are both interesting and valuable. The printing and make-up are typical of the fine work of the publishing house from which it comes. The book can be unreservedly recommended to all libraries, medical or otherwise, and to all who are interested in the history of medicine.

MAZÛCK P. RAVENEL

Public Welfare in Transition: Annual Report—By William Hodson, Commissioner. New York: Department of Public Welfare of the City of New York (902 Broadway), 1937. 132 pp.

Elimination of relief for able-bodied

men and women through adjustments in our social and industrial systems, wider and more adequate social insurance coverage to reduce further the nation's home relief rolls, and a flexible relief program for the residual caseload of unemployables that can be contracted or expanded as needs indicate, are urged in the 1937 annual report of the New York City Department of Welfare.

In December, 1937, New York State had a total of 102,926 needy persons over 65 years of age receiving Old Age Assistance. This means that out of every 1,000 individuals 65 years and over in New York State, 133 received this kind of aid. Thirty-eight states had a larger number of recipients per 1,000 than New York.

At the end of the year 10,258 veteran families, comprising over 35,000 individuals were under the department's care. The cost of veteran relief for the year exceeded \$4,000,000. Eighty-five per cent of the Veterans' Division staff are ex-service men. Approximately 4,000 employable veteran recipients were given WPA employment during the year. Improvements in aid to needy veterans included a more elastic budget, medical and nursing services, prescription allowances, dental and optical treatment, housekeeping service in emergencies, and other aid, as needed. The Division of Blind Assistance was formed in May, 1937, to administer financial aid to eligible blind persons in accordance with the revised State Public Welfare Law and Federal Social Security Act. Prior to 1937, assistance was given to the "Poor Adult Blind" in semi-annual installments under the provisions of the Charter of the Greater City of New York. The principal changes under the new law are: assistance is issued on a monthly basis; the budget is based upon actual minimum requirements; eligibility for assistance is more carefully determined; consideration is given to the special

needs incident to blindness. Increased allowance enables the recipient to sustain himself without street begging or supplementation from other agencies, Mr. Hodson points out, and the recipient is able to plan his expenditures to better advantage with payments made each month instead of semi-annually. A total of \$183,768 was expended for Blind Aid last year.

At the end of the year there were 22,692 destitute, neglected, or abandoned children under the care of the Children's Division of the department. Home relief has tended to reduce the number of children who had to be cared for by the department in boarding houses and institutions. The department expended approximately \$27,000,000 during 1937, of which \$15,025,000 were city funds, \$6,280,000 were federal funds and \$5,695,000 were state funds.

IRA V. HISCOCK

Emotional Hygiene: The Art of Understanding—*By Camilla M. Anderson, M.D. Philadelphia: Lippincott, 1937. 242 pp. Price, \$2.00.*

This is one of the finer examples of popular treatment of mental hygiene that professional writers on the subject have turned out in increasing quantity in recent years. As such it will play a useful part in the growing importance of public education in the principles and practices of mental health as visualized by those engaged in organized work in this segment of the public health movement. The author has turned to good account her valuable experience as Secretary of the Pennsylvania Mental Hygiene Committee, and as a psychiatric teacher in the field of nursing education, in bringing the complexities and ramifications of the subject down to the level of understanding of the "man in the street." Indeed, she has done it "almost too well" in that she has over-simplified some of the theories and concepts of the

"new psychologies" upon which mental hygiene is based, and perhaps exaggerated their therapeutic and preventive values, but this is a minor criticism to make of what is, on the whole, a sound exposition of its fundamentals as generally accepted and taught by present-day psychiatry, and presented in an unusually attractive and readable fashion.

Significantly, the title of the book emphasizes the primacy of the emotions as against the intellect in determining healthy mental adjustment and personality development, as conceived by modern students of human behavior oriented to the philosophy and outlook of twentieth century mental medicine and hygiene. The critical reader may find fault with some of the spiritual interpretations of human nature, as the author develops them in the light of Freudian psychology and where they conflict with more orthodox and traditional theological and moral concepts, but, discounting these and after applying his own correctives, such a reader will agree with the general tenor of her discussions and will accept her teachings as having great practical value in the everyday task of the everyday man in better understanding and dealing with his fellow man.

PAUL O. KOMORA

City Hangs Up Eight New Health Records: 1938 Annual Report from the Health Commissioner of New York to the Mayor. *Issued for release in newspapers under date of January 1, 1939.*

The introductory paragraphs of this news release summarize the outstanding features in Commissioner Rice's annual report. There follow extensive tables of statistics on the major causes of death, in which the rates for 1938 are compared with those for the last 8 years.

The whole article furnishes support

to Dr. Rice's assurance to contemplated visitors at the 1939 New York World's Fair "that everything has been done to make their stay in New York City safe from the health standpoint."

For an estimated population of 7,491,790 the general death rate of 9.8 per 1,000 recorded in 1938 is the lowest in the city's history. The reports on specific diseases indicate a similar substantial reduction in the death rates from accidents, tuberculosis, pneumonia, typhoid fever, and diphtheria, resulting in the lowest figures ever registered in the city. The infant and maternal mortality rates are also so low as to constitute a record achievement.

The Commissioner attributes the continued high rates of death from the degenerative diseases to the city's aging population. However, the specific death rates in the higher age groups for diabetes, cancer, and diseases of the heart and arteries do show a decrease. The decline in the city's birth rate has continued.

A tribute to the fine leadership of Mayor LaGuardia is tendered for his aid in advancing the establishment of the district health center program. The coöperation of the newspapers is also acknowledged for their excellent work in publicizing the venereal disease campaign.

Explanatory paragraphs accompany the statistical section which concludes the report. The tables are preceded by the general statement that health conditions were exceptionally good, with no epidemics, major catastrophies, or unfavorable weather conditions in evidence.

IRA V. HISCOCK

Educational Broadcasting—1937
—C. S. Marsh, Editor. Chicago: University of Chicago Press, 1938. 405 pp. Price, \$3.00.

This is a report of the Second National Conference on Educational Broadcasting held in Chicago, November 29–

December 1, 1937, the report being published October 25, 1938.

Health broadcasting is not mentioned, except when Douglas Griesemer, American National Red Cross, in a discussion reminded the audience that numerous health and welfare agencies have had considerable experience in the educational use of radio.

Notwithstanding the fact that the American Public Health Association is listed as one of the sponsors, and several national health agencies appear as coöperating groups, neither radio educational leaders nor the national adult education groups have been really conscious of health education.

This situation emphasizes the importance of the book, which offers a wealth of ideas and information on broadcasting as an educational medium, and the complications growing out of the peculiar nature of radio as a business. We need some far-sighted health people, informed and willing to participate in the broad development of broadcasting as an educational medium. This volume provides much valuable background material.

Of especial interest are chapters on "Talks Programs" (the one chapter giving something on technics), "What Happens to the Listener," "Radio and the Child's Education," "Classroom Use of Radio," and "Symposium of Listeners."

EVART G. ROUTZAHN

The Life of Chevalier Jackson: An Autobiography. New York: Macmillan, 1939. 229 pp. Price, \$3.50.

This autobiography is not only a human document of rare interest but also the story of remarkable achievement in a new field which has brought much relief from suffering and saved the lives of thousands, mostly children. It is the story of a man who was a frail child, living under conditions not con-

ducive to high mental or physical development, and handicapped by poverty. A devotion to his parents and a natural bent for mechanics were the two great interests in his life. "An innate and insatiable urge to make things" possessed him from early childhood throughout his life. He had a struggle to get his education and for some time made his own way as a decorator of china and glass, sometimes as a book agent, and again as a member of the crew of a Gloucester fishing schooner. He finally saved enough money to go to London "the cradle of laryngology" and get postgraduate work in laryngology under Sir Morrell Mackenzie.

His practice, which began in Pittsburgh, was among the very poor, but he soon acquired a reputation for skill in diseases of the upper air passages, the beginning of his world-wide fame in esophagoscopy and bronchoscopy. He developed in 1890 his first esophagoscope which he perfected 12 years later by adapting a light such as was in use on the cystoscope. This enabled him to see into the esophagus and soon he had brought to him many children suffering from stricture due to swallowing lye. He was so impressed by the frequency of these accidents that he devoted much of his energy to laws requiring proper labeling of such dangerous poisons, and to him more than any other person is due the law passed in 1927 requiring poison and antidote labels to be put on each such container.

After some years Jackson evolved the bronchoscope which will always bear his name, and it was perfected year by year. Before his invention the mortality among those into whose bronchi and lungs foreign bodies found their way was 98 per cent; now 98 per cent survive. It must be remembered that Jackson has a marvelous skill in operation, being ambidextrous, in addition to his mechanical genius, but fortu-

nately he is as apt in teaching as in operating, so there are now an imposing number of skilled men in this country who have come under his influence who are doing excellent work with the aid of his instruments.

The book contains 8 pages of photographs of foreign bodies—jackstones, safety pins, tacks, staples, buttons, etc., and even false teeth—removed from patients, chiefly children. The legend on each page urges prevention of such accidents.

The book itself is an outstanding example of the printer's art. Issued in May, 1938, there have been already three reprintings. Many beautiful illustrations in color by the author show him to be a master of the pencil, brush, palette knife, dry point, and colored chalk. There are also a number of photographs. Dr. Jackson has received honors from every part of the world. His book deserves to be read widely and to find a place in private as well as public libraries, medical and lay

MAZÏCK P. RAVENEL

Health Education by Isotype—By Otto Neurath, Ph.D., and H. E. Kleinschmidt, M.D. New York: American Public Health Association, 1939. 32 pp. Price, \$.25.

Almost every one of us, at one time or another, has had a health story to tell. Usually, when inspiration seizes us, we rush into print—or into display—hustling to get the job done while our ideas are still in their first state of white heat. Far too often the results are eloquent of the frenzied rush. If there is one thing that this pamphlet makes crystal clear, it is that reflection, planning, analysis, and critical appraisal are all essential in telling a health story.

Health Education by Isotype is a persuasive plea for the use of this visual language in interpreting health to young and old, to the erudite and to the

uneducated. Isotype is not offered as ready means for the mechanical translation of any health idea into pictures. Instead, it is suggested as a valuable medium through which the educator, working jointly with the specialist in the method, can often reveal social facts most effectively.

Varied uses of Isotype in text illustrations, as lecture aids, for classroom use, in slides and motion pictures, as well as for exhibits, are discussed briefly.

Every public health worker—administrator, engineer, nurse, as well as educator—will profit by exposing himself to this Isotype infection, for it tends to make one immune to that common ailment, “rush of brains to the head.” To them all we commend this pamphlet. Its publication has been made possible through the generosity of the Carnegie Corporation of New York to which the American Public Health Association makes grateful acknowledgment. RAYMOND S. PATTERSON

Nutrition: The Newer Diagnostic Methods. *Proceedings of the Round Table on Nutrition and Public Health—Sixteenth Annual Conference of the Milbank Memorial Fund, March 29–31, 1938. New York: Milbank Memorial Fund, 1938. 192 pp. Price, \$1.00.*

This volume sets forth the proceedings of the 16th annual conference of the Milbank Memorial Fund. One round table was devoted entirely to nutrition and its relation to public health. Impaired nutrition among the general population is sufficiently exten-

sive to make it a matter of concern to public health agencies. Means must be devised to detect nutritional deficiencies long before they produce their most obvious characteristics. Work needs to be done in determining the constituents of optimal nutrition and means provided for their attainment by the average individual.

To these ends discussions were held on various methods for detecting early nutritional defects. Dr. T. Wingate Todd opened the discussion on the use of roentgenology. Drs. Hecht and Feldman presented the use of the dark adaptation test in detecting avitaminosis A. The detection of early vitamin B₁ deficiency by the use of the electrocardiograph and of specific color tests was discussed by Dr. Weiss and by Drs. Levine and Marples respectively. Dr. Spies covered the subject of nicotinic acid and its relationship to pellagra while Drs. Farmer and Abt discussed the utility of plasma ascorbic acid tests for latent avitaminosis C.

The detection of nutritional anemia by hematologic methods was presented by Dr. Guest. Dr. Youmans opened the discussion on the use of plasma protein determinations in the diagnosis of edema of nutritional origin.

The tables, graphs, and illustrations as well as the supplementary informal discussions, add greatly to the value of the record. The correlation of the experiences of different investigators in a conference of this type not only serves to promote scientific advance as a whole but their record will serve to inform and stimulate others.

IRA A. MANVILLE

BOOKS RECEIVED

- RESEARCH AND STATISTICAL METHODOLOGY. Books and Reviews, 1933-1938. By Oscar Krisen Buros, Editor. New Brunswick, Rutgers, 1938. 100 pp. Price, \$1.25.
- THE MICROBE MAN. A LIFE OF PASTEUR FOR YOUNG PEOPLE. By Eleanor Dooley. New York: Appleton, 1939. 160 pp. Price, \$1.50.
- WIDE ROAD AHEAD. THE STORY OF A WOMAN BACTERIOLOGIST. By Anne B. Fisher. New York: Dutton, 1939. 276 pp. Price, \$2.50.
- ADVENTURES WITH A LAMP. THE STORY OF A NURSE. By Ruth Louise Partridge. New York: Dutton, 1939. Price, \$2.50.
- A TEXTBOOK OF APPLIED MICROBIOLOGY AND PATHOLOGY. By Thurman B. Rice. 2nd ed. of APPLIED BACTERIOLOGY. New York: Macmillan, 1939. 271 pp. Price, \$2.50.
- PRINCIPLES OF HEALTH EDUCATION. By C. E. Turner. 2nd ed. New York: Heath, 1939. 335 pp. Price, \$2.00.
- BIG FLEAS HAVE LITTLE FLEAS, OR WHO'S WHO AMONG THE PROTOZOA. By Robert Hegner. Baltimore: Williams & Wilkins, 1938. 285 pp. Price, \$3.00.
- REAL LIVING. BOOK I. A HEALTH WORKBOOK FOR BOYS IN JUNIOR HIGH SCHOOLS. By Ross L. Allen. New York: Barnes, 1939. 106 pp. Price, \$.50.
- REAL LIVING. BOOK II. A HEALTH WORKBOOK FOR BOYS IN SENIOR HIGH SCHOOLS. By Ross L. Allen. New York: Barnes, 1939. 68 pp. Price, \$.50.
- THE NEWER KNOWLEDGE OF NUTRITION. By E. V. McCollum, Elsa Orent-Keiles and Harry G. Day. 5th ed. Entirely Rewritten. New York, Macmillan, 1939. 701 pp. Price, \$4.50.
- BOOKS AND BABIES. By Garry Cleveland Myers and Clarence Wesley Sumner. Chicago: McClurg, 1938. 116 pp. Price, \$1.75.
- NEAR-SIGHTEDNESS IS PREVENTABLE. By Emanuel M. Josephson. New York: Chedney Press, 1939. 46 pp. Price, \$1.50.
- REORGANIZATION OF THE NATIONAL GOVERNMENT. WHAT DOES IT INVOLVE? By Lewis Meriam and Laurence F. Schmeckebier. Washington: Brookings Institution, 1939. 272 pp. Price, \$2.00.
- HEREDITY AND ENVIRONMENTAL FACTORS IN THE CAUSATION OF MANIC-DEPRESSIVE PSYCHOSES AND DEMENTIA PRAECOX. By Horatio M. Pollock, Benjamin Malzberg and Raymond G. Fuller. Utica: State Hospitals Press. 473 pp. Price, \$2.50.
- SOCIAL PSYCHOLOGY OF ADOLESCENCE. By E. DeAlton Partridge. New York: Prentice-Hall, 1938. 361 pp. Price, \$2.75.
- CIVILIZATION AGAINST CANCER. By Clarence Cook Little. New York: Farrar & Rinehart, 1939. 150 pp. Price, \$1.50.
- AMERICAN MEDICINE MOBILIZES. By James Rorty. New York: Norton, 1939. 358 pp. Price, \$3.00.
- NURSERY SCHOOL EDUCATION. By Josephine C. Foster and Marion L. Mattson. New York: Appleton, 1939. 361 pp. Price, \$2.50.
- COMMUNICABLE DISEASES FOR NURSES. By A. G. Bower and E. B. Pilant. 4th ed. Philadelphia: Saunders, 1939. 550 pp. Price, \$3.00.
- PULMONARY TUBERCULOSIS IN ADULTS AND CHILDREN. By James Alexander Miller and Arvid Wallgren. New York: Nelson, 1939. 196 pp. Price, \$3.50.
- THE PSYCHOLOGY OF MAKING LIFE INTERESTING. By Wendell White. New York: Macmillan, 1939. 215 pp. Price, \$2.50.
- AN INVESTIGATION OF THE EFFECTS OF MILK WASTES ON THE BRISTOL AVON. Fishery Investigations. Series 1. Vol. IV. No. 1. H. M. Stationery Office: London, 1938. 76 pp. Price, \$1.35.
- BULLETIN OF THE HEALTH ORGANIZATION. Vol. VII, No. 4. Geneva: League of Nations, August, 1938. Price, \$.65. Columbia University Press, Sales Manager.
- BULLETIN OF THE HEALTH ORGANIZATION. Vol. VII, No. 5. Geneva: League of Nations, October, 1938. Price, \$.65. Columbia University Press, Sales Manager.
- DIAGNOSTIC STANDARDS. TUBERCULOSIS OF THE LUNGS AND RELATED LYMPH NODES. Tentative Edition, 1938. New York: National Tuberculosis Association, 1938. 32 pp. Price, \$.05 each; 100, \$3.50; 1,000, \$32.50.
- ECONOMICAL ADMINISTRATION OF HEALTH INSURANCE BENEFITS. Studies and Reports. Series M (Social Insurance) No. 15. Washington: International Labor Office, 1938. 332 pp. Price, \$1.75.
- SANITARY LAW IN QUESTION AND ANSWER. By Charles Porter and James Fenton. 4th ed. London: Lewis, 1939. 352 pp. Price, \$2.75.
- PROCEEDINGS OF THE AMERICAN PHILOSOPHICAL SOCIETY, HELD AT PHILADELPHIA FOR PROMOTING USEFUL KNOWLEDGE. Vol. 80, Feb. 10, 1939. No. 3. Philadelphia: The American Philosophical Society, 1939. 476 pp. Price, \$.75.
- ENGLISH, GERMAN, FRENCH, ITALIAN, SPANISH MEDICAL VOCABULARY AND PHRASES. By Joseph S. F. Marie. Philadelphia: Blakiston, 1939. 358 pp. Price, \$3.00.
- RHEUMATISM. By H. Warren Crowe. London: Bale, 1939. 280 pp. Price, \$3.75.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Montgomery County (Md.) Steps Out—Do you know what "the adjustment of the total personality" means? Even if you do, you will still find much of interest in this account of a year's experience with a county-wide psychiatric service. If you don't the article will prove practically a new department in your little store of knowledge.

ANON. Psychiatric Service in a County. Health Officer. 3, 10:287 (Feb.), 1939.

130,215,000 Souls—This is the population of the continental United States on July 1, 1938, as estimated by the Bureau of the Census. It is based on births, deaths, and excess of immigration over emigration. Tables are given showing estimated population annually since the 1930 census, and by states.

ANON. Estimated Population of Continental United States and Outlying Territories and Possessions July 1, 1938. Pub. Health Rep. 54, 5:180 (Feb. 3), 1939.

Life Expectancy Rate Up—Most of us assume that the actual average age at death is the same thing as life expectancy at birth. This is not likely to be true, for the expectation of life is based upon a hypothetical group subject to the same age specific rates throughout life. This is made clear in a brief note quoting Dr. Dublin's estimation of a life expectancy rate of 62.0 for last year.

ANON. Estimated Life Expectancy for the United States, 1938. Pub. Health Rep. 54, 8:311 (Feb. 24), 1939.

Slaughter House By-Products—It is a great comfort to know the derivation of the word "catgut." It is not what you think, but is supposed

to have come from kit-gut, a kit being a small violin. The sanitary features concerned in the various processes of making sausage casings, etc., also make the paper an interesting one.

AUSTIN, J. The Hygienic Treatment and Disposal of Offal and By-Products in Abattoirs. J. Roy. San. Inst. 59, 9:622 (Mar.), 1939.

Health Facilities' Study—Available clinic services depend upon the size of the community. In counties predominantly, rural health programs are seriously handicapped by the absence of clinics so necessary in completing the health educational activities of the health agencies. This is the finding of an extensive survey of counties.

BOROWSKI, A. J., and PLUMLEY, M. L. Preventive Clinic Facilities Available in Ninety-four Selected Counties of the United States. Pub. Health Rep. 54, 9:335 (Mar. 3), 1939.

Anent Spiritual Vitamins—In this revealing dissertation on mental hygiene addressed to the informed layman there is much of immediate value to all health workers. Personality, we are told, derives from *persona*, the mask put on by the ancient actor. In mental disorders, the mask is broken and we see revealed in all their repulsiveness the processes of human nature. What this means in our attitudes toward public mental health administration is made clear. The desire to quote here from the many brilliant passages is almost irresistible.

CAMPBELL, C. M. Human Needs and Social Resources. Sci. Month. 48, 4:293 (Apr.), 1939.

The Physical Jerks and Public Health—One gets the impression from this British discussion that if indi-

viduals will only do something about maintaining physical fitness, then the level of public health will be raised. Health education is approved and urged as a public project. In the ensuing discussion favorable mention is made of the periodic medical examination that is "in force in parts of the U. S. A."

EDWARDS, T. P. Physical Fitness in Relation to Public Health. *J. Roy. San. Inst.* 59, 8:573 (Feb.), 1939.

Con Versus Pro in Social Medicine—Two able articles, one pointing out the dangers of the proposed national health scheme, and the other, the need for a method of providing adequate medical care, are presented. The editors should be widely commended for this eminently fair airing of both sides, a procedure which is all too infrequently practiced in this land of the free and the home of the brave.

FISHBEIN, M. American Medicine and the National Health Program, and

PETERS, J. J. Medicine and the Public. *New Eng. J. Med.* 220, 12:495 (Mar. 23), 1939.

School Attendance by Contacts—British views on the exclusion from school of communicable disease contacts. The author wishes the rigorous regulations to be changed to allow measles, German measles, and chicken pox contacts to go to school, and the return of scarlet fever and diphtheria home contacts one week after the isolation of the case.

FORBES, D. School Exclusion in Infectious Disease. *J. Roy. San. Inst.* 59, 8:559 (Feb.), 1939. (See also) Terminal Disinfection and Exclusion from School. *Pub. Health.* 52, 5:133 (Feb.), 1939.

For All Health Propagandists to Read—Here is good straightforward reporting upon experience with the health examination. The author urges others to make use of it, even though he concludes that it cannot be of great immediate importance to preventive

medicine because we still know so little about the mode of origin of so many diseases.

FRITZ, R. The Periodic Health Examination as a Method of Clinical Investigation. *J.A.M.A.* 112, 12:1116 (Mar. 25), 1939.

Where Relaxed Vigilance Takes Its Tragic Toll—Reporting upon 470 water-borne disease outbreaks in the United States and Canada over a 16 year period, the conclusion is reached that the data presented do not indicate any inherent weaknesses in operating methods of water treatment plants, but rather that accepted methods are not always followed. Too much faith often is placed in a limited number of water tests. More attention should be given to sources of pollution, and to an ample factor of safety in plant operation. Needed research also is listed in this comprehensive study.

GORMAN, A. E., and WOLMAN, A. Water-Borne Outbreaks in the United States and Canada, and Their Significance. *J. Am. Waterworks Assoc.* 31, 2:225 (Feb.), 1935.

Doctors, Nurses, and Deliveries—In two rural counties in the South, a health department nursing service has done much to improve maternal health through successful home deliveries. Experience shows that this service has not detracted from the effectiveness of the generalized health department nursing program.

LAPHAM, M. E. Coöperative Obstetric Delivery Service by Private Physicians and County Health Departments. *South M. J.* 32, 2:191 (Feb.), 1939.

Finding Operable Cancer—Stomach, colon, and breast are the frequent sites of cancer. Extirpation is not performed in more than half the cases because they are hopeless, but surgeons are now discovering a larger proportion of operable cancers, because the medical profession is beginning to discard textbook signs supposed to be pathognomonic of

cancer (there are none of early cancer).

MACCARTY, W. C. A Hopeful Factor in the Cancer Problem. *Am. J. Cancer.* 35, 2:275 (Feb.), 1939.

Pertussis Vaccine Protects—Another successful experience with vaccine in the prevention of whooping cough. In the test group the communicability rate was 28 per cent, whereas it was 85 per cent in the control group.

MILLER, J. J., and FABER, H. K. Immunization Against Pertussis. *J.A.M.A.* 112, 12:1145 (Mar. 25), 1939.

Bending the Twig—Curious-minded sanitarians will find much of interest in this series of papers about the purposes of the Bureau of Child Guidance in the New York City schools; the difficulties inherent in a program involving two professions; and diverse administrative problems together with their solutions. A little knowledge about what others are doing never did anyone much harm.

O'BRIEN, F. J., *et al.* The Bureau of Child Guidance, Board of Education, City of New York (and five related papers). *Understanding the Child.* 7. 4:3 (Jan.), 1939.

Where to Hunt T.B. Cases—Tuberculosis case finding is most productive when directed to the examination of contacts and referred suspected patients, or group of examinations in certain industries and adults generally in the lower economic strata. These two types of services are of more importance than the routine examination of school children. Experience in New York State confirms this opinion, which will bring no comfort to summer campers or the open air school marms.

PLUNKETT, R. E. Case-Finding. *Am. Rev. Tuberc.* 39, 2:256 (Feb.), 1939.

Which Toxoid?—Animal experiments are reported which indicate that one dose of toxoid-alum precipitate equals three doses of unmodified toxoid.

A high degree of immunity results from one dose of toxoid-alum precipitate followed 2 weeks later with one of unmodified toxoid, and the antitoxic titer can be enhanced by another dose of unmodified toxoid at the end of a year.

POVITZKY, O. R. A Comparison of Antitoxic Response and Persistence of Antitoxin in the Blood of Guinea Pigs Injected with Different Preparations of Diphtheria Toxoid. *Am. J. Hyg.* 29, 2:89 (Mar.), 1939.

Stamping Out Syphilis—Health officials and others bent on drawing up laws for the control of syphilis will do well to read all the evidence here presented which suggests the unwisdom of attempting to cover all the medical exigencies. The simpler, the better, evidently.

STOKES, J. H., and INGRAHAM, N. R. Syphilis and the Law. *J.A.M.A.* 112, 12:1133 (Mar. 25), 1939.

Mouth Lesions and Dietary Deficiencies—*Macacus rhesus* monkeys, whose dental formula is similar to man's and who require both vitamin C and nicotinic acid, as does man, were tested with vitamin deficient meals. Varying manifestations of gingivitis and stomatitis (in one study), and (in the other) necrosis of the periodontal tissues, followed the feeding of vitamin deficient diets. Control animals had healthy mouths. One may assume that none of the monkeys brushed his teeth twice a day or saw his dentist twice a year.

TOPPING, N. H., and FRASER, H. F. Mouth Lesions Associated with Dietary Deficiencies in Monkeys, and

TOMLINSON, T. H., JR. Oral Pathology in Monkeys in Various Experimental Dietary Deficiencies. *Pub. Health Rep.* 54, 11:416 (Mar. 17), 1939.

It Can Be Done—Practical methods for the removal of dangerous dusts are described in this article which fixes 10 million particles per cu. ft. as the safe upper limit of dustiness. The illustrations are good, too.

URBAN, E. C. J. Ventilation in the Granite Industry. *J. Indus. Hyg. & Toxicol.* 21, 3:57 (Mar.), 1939.

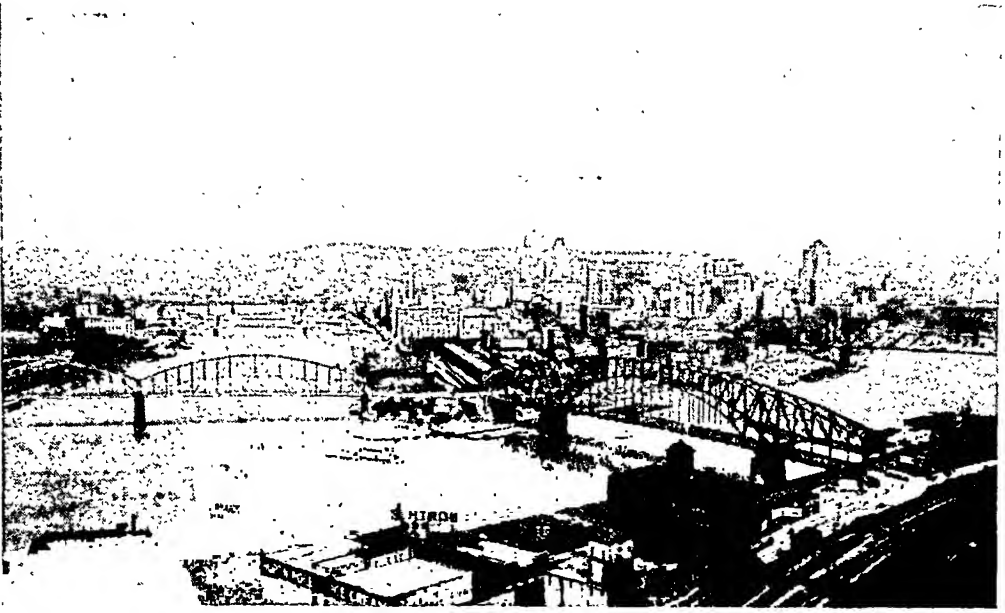
Franklin the Hygienist—The health worker who isn't delighted with the story of "Dr." Franklin's excursions into the fields of medicine and hygiene, must be a crusty old work horse indeed. During his eighty-one years, the redoubtable Benjamin certainly did his share of philosophizing.

WRIGHT, R. D. "Dr." Franklin. *Health Officer.* 3, 10:308 (Feb.), 1939.

Questionable Biologic Concept Bites Dust—Collapse therapy results

indicate that there is but little, if any, difference between whites and negroes in natural resistance to tuberculosis, and physical habitus appears to play no part in the different illness rates. When we, the people, decide that it will pay to provide adequate isolation for colored cases and allow better general living conditions for this population, then death rates among the colored will repeat the experience of the white race. A lot more hygienic hooey is disproved in this excellent paper.

WILLIAMS, G. D., and APPLEWHITE, J. D. Tuberculosis in the Negroes of Georgia. *Am. J. Hyg.* 29, 2:61 (Mar.), 1939.



"The Golden Triangle" and the "Point." The junction of the Allegheny and Monongahela Rivers to form the Ohio

PITTSBURGH EXPECTS YOU IN OCTOBER

CITIES have their own personalities, even as you and I.

Some are short, bustling individuals, always on the jump. Others are lean, white-haired men, fond of their firesides and slippers.

But the personality of Pittsburgh—"Vulcan's Workshop"—is the strength of enormous industry, the energy of coal and fire, and the vigorous pulse of great water, rail, and air transportation systems.

Pittsburgh is the birthplace of air hygiene. And the district, in which heavy industry predominates, is notable for its constructive activities in improving industrial health conditions.

Yet with all that, there is still a greater personality—a personality with culture and refinement deeply rooted in a high regard for civic duty and social responsibility.

Away from its busy terminals, its factories and stores, is the Pittsburgh of intellectual and artistic achievement, that social inner-existence of the city,

made possible by municipal statesmanship.

The Civic Center of Pittsburgh has achieved international renown. Its Schenley Park, comprising 383 acres, is one of the world's finest. It was donated to the city by Mrs. Mary E. Schenley of London, England.

The Civic area forms a modern Acropolis—a city within a city—with stately cathedrals, shrines, colleges, laboratories, museums, libraries, homes, hotels, memorials, and recreation and sport pavilions, representing an investment of more than a half billion dollars.

Convention delegates will have every opportunity to visit the gigantic modern workshops of heavy industry, as well as the cultural centers of Pittsburgh.

You will see Phipps Conservatory with its 125,000 species of flowers; the famous Andrew Carnegie Museum, the Carnegie Library of a million volumes; the Carnegie Art Galleries, where the

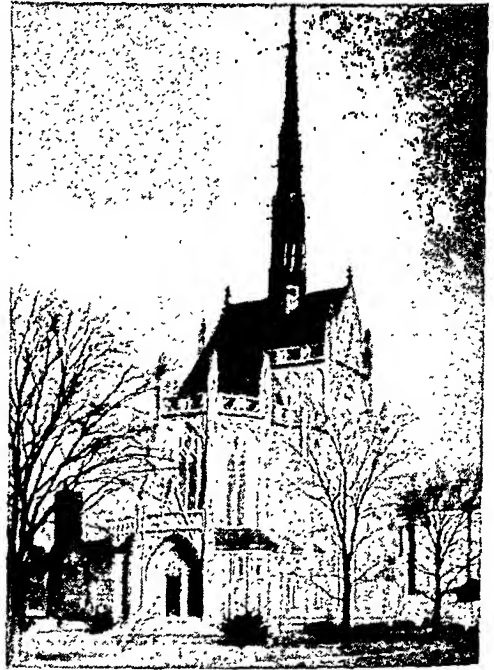
world's only International Art show is an annual feature and which will be in progress during the Association's meeting, the Carnegie Music Hall, the Mellon Institute, Heinz Memorial Chapel, Syria Mosque, which has the largest Shrine membership in the World; the Cathedral of Learning of the University of Pittsburgh, rising 542 feet into the air, the tallest skyscraper schoolhouse in the world; the terraced campus of Carnegie Institute of Technology; and the memorial to Stephen Collins Foster, composer of "Old Folks at Home" and "Old Black Joe."

Pittsburgh is not just another city. It is the heart of Allegheny County, the hub of an industrial empire, which supplies the wheels, power, generators and turbines to keep America and the rest of the world on the move, and to provide the structural materials for the "framework" of other cities. The steel for the Trylon and Perisphere of the World of Tomorrow in New York was made in Pittsburgh. Whatever the world needs from heavy industry, Pittsburgh can produce.

Pittsburgh and Allegheny County cover 21,103,980,000 feet of earth, on which live and work nearly 2,000,000 people. Last year the 2,000 manufacturing plants of the city and county shipped—over five railroads and three rivers—162 million tons of materials valued at a half billion dollars. This tonnage was 25 times that which passed through the Panama Canal in the same year.

In the county are 4,000 farms, valued at \$33,000,000, whose products last year sold for \$7,000,000. Our steel, iron, coal, aluminum, glass, food, electrical and other supplies of all kinds have been placed on markets in all parts of the world.

Pittsburgh produces the steel for skyscrapers, bridges, houses, highways, ships and hair curlers, just as examples of the more than 5,000 uses to which



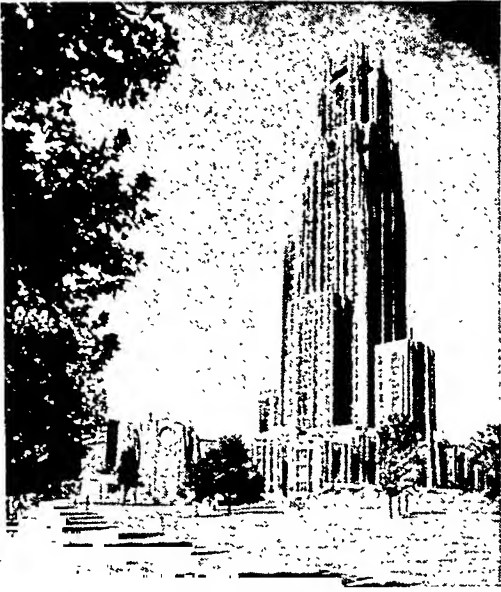
The Heinz Memorial Chapel of the University of Pittsburgh

this indispensable metal has been applied. The aluminum pots and pans in which your food is cooked come from Pittsburgh, and Heinz food specialties are found on millions of tables.

Pittsburgh fabricates aluminum and steel for streamline trains. It furnishes the steel rails, locomotive parts, the air brakes and generators which make the trains move over the large railroad network from the Atlantic to the Pacific Coast and throughout the world.

And Pittsburgh supplies much of the steel and most of the safety glass which go into the annual production of more than 4,000,000 automobiles. The famous Westinghouse Electric and Manufacturing Company, whose founder developed the use of alternating electric current, manufactured the recently installed huge electrical apparatus for the generation of power and the furnishing of a water supply to Pacific Coast cities from Boulder Dam.

Likewise, the contributions of Pitts-



World's Tallest Educational Building. The University of Pittsburgh's "Cathedral of Learning," 42 story Gothic structure which houses the undergraduates' schools, School of Law, Bureau of Business Research, Research Bureau for Retail Training, Graduate School, libraries, classrooms, and offices. Twenty-two other buildings on the campus house the professional and technical schools

burgh men and women in the conservation of health, and in medical and biological research, have been outstanding.

In Pittsburgh are located 38 hospitals. Within the metropolitan limits 1,800 physicians and surgeons minister to the needs of the community.

As an example of teamwork between medical science and heavy industry, surgeons found some months ago that a new form of stainless steel can be used remarkably well for permanent braces or for plating broken backs, arms and legs.

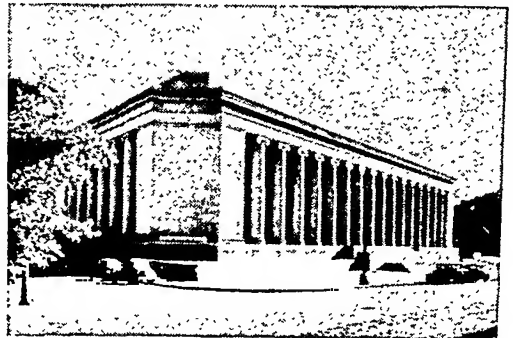
Behind the rugged grandeur of the Steel City and its products, is the less apparent but equally dramatic story of Pittsburgh's preëminence as a center of science and industrial research. This research is constantly creating new and better articles for the markets of the world and the comforts of mankind.

Mellon Institute, through its pure and applied researches, ministers to the humanities and to the industries. Extensive laboratories are maintained in the district by the U. S. Bureau of Mines and by the following world-known commercial enterprises: Aluminum Company of America, Carnegie-Illinois Steel Corporation, Gulf Oil Corporation, H. J. Heinz Company, Jones & Laughlin Steel Corporation, Pittsburgh Plate Glass Company, and Westinghouse Electric & Manufacturing Company.

From the laboratories of the Standard Chemical Company of Pittsburgh came the first radium produced in the United States. This gift to the medical profession of America was developed in 1913.

Air Hygiene Foundation, a national science organization supported by 250 industrial concerns throughout the country, maintains headquarters in Pittsburgh at Mellon Institute. The Foundation is working for the improvement of employee health in the nation's plants and mines, and for the prevention of occupational disease.

The city boasts five institutions of higher learning, all of which are well equipped for science studies. These institutions are University of Pittsburgh, Carnegie Institute of Technology, Duquesne University, Pennsylvania College for Women, and Mt. Mercy College.



The new home of Mellon Institute



A reversing mill at the Irvin Works of the Carnegie-Illinois Steel Corporation

Yes, Pittsburgh furnishes the eye-appealing answer to the dreams of countless Americans who wish to paint, see, hear, feel and record the march of human progress.

Pittsburgh is a workshop for the world, the gateway to the great American West, the home of new sights and

new experiences, spread over many hills and valleys, served by 1,547 bridges, through country rich in history, spectacular for its industry, and charming over its miles of ever-changing landscape and scenic beauty on the historic "Point" of three rivers—the birthplace of the "Beautiful Ohio."

Proper recreation and play is provided for everyone on 12,000 acres of playgrounds, 40 swimming pools, 75 tennis courts, and half dozen lakes, a zoo, and 38 golf courses—more golf courses than can be found in any other county in the United States.

And in the evening, after sundown, visitors may view the moon in its orbit and the Parade of Stars across the heavens, through the giant eyes of telescopes and cameras of the Allegheny Observatory and in the auditorium of the Buhl Planetarium.

Pittsburgh is for the first time to act as host to the American Public Health Association. You are assured of a warm welcome and a most enjoyable meeting. Reserve October 17-20 on your calendars!

ASSOCIATION NEWS

"This exhibit on
Public Health Administration
is sponsored by the
American Public Health Association."

MEMBERS of the Association visiting the New York World's Fair this year will read this caption on a plaque identifying the exhibit which they have made possible by their contributions.

Acknowledgment is made to the following individuals and organizations for their gifts to the exhibit fund:

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Massachusetts Public Health Assn.
Lucy E. Massey
Fred M. Meader, M.D.
Mechlenburg County Health Dept. (N. C.)
Metropolitan Life Insurance Co.
(Contribution from group of nurses, Hempstead, L. I.)
Friend Lee Mickel, Sc.D.
Guy S. Millberry, D.D.S.
I. Franklin Miller, D.D.S.
Sumner M. Miller, M.D.
Milwaukee Health Dept.
A. B. Mitchell, M.D.
Harold H. Mitchell, M.D.
Gordon B. Moffat, M.D.
D. C. Y. Moore, M.D.
Stuart Mudd, M.D.
E. K. Musson, M.D.
Nassau County Public Health Nurses Assn.
National Lime Assn.
National Soc. for Prevention of Blindness
J. Louis Neff
Philip E. Nelbach
Nels A. Nelson, M.D.
Sophie C. Nelson, R.N.
New York State Health Dept.
Wade F. Alexander
Wendell R. Ames, M.D.
David B. Ast
R. D. Bates
Bertha C. Beers
Helen A. Bigelow
Bernard M. Blum, M.D.
James C. Boland, M.D.
Henry A. Bray
Elizabeth L. Brezee
Clara May Briggs
William A. Brumfield, Jr.
Nettie B. Bubb
E. J. Buckley
Ray Burke
Harry L. Chant, M.D.
Julia M. Coffey
Marion B. Coleman
Frank E. Coughlin
Charles R. Cox
Dr. and Mrs. A. H. Cummings
J. Sumter Cunningham, M.D.
A. F. Dappert
Jane S. Dayton
Archibald S. Dean, M.D.
J. K. Deegan, M.D.
J. V. DePorte, Ph.D.
Earl Devendorf
J. Rosslyn Earp, Dr.P.H.
Harry F. Edinger

W. J. Erickson
Winifred L. Erskine
Raymond D. Fear, M.D.
Elizabeth M. Gardiner, M.D.
Joseph P. Garen, M.D.
Ruth Gilbert, M.D.
F. W. Gilcreas
Edward S. Godfrey, Jr., M.D.
Marjorie Gooch
Richard C. Gorman, Jr.
Dr. Gordon Gray
Don M. Griswold, M.D.
Jean M. Henry
C. A. Holmquist
Anna Hooley
Albert I. Howd
Anna I. Hudson
Samuel Hyman
Hollis S. Ingraham, M.D.
Juliet Julian
James E. Kerslake
John E. Kiker, Jr.
Adelia M. Kiley
Harvey S. Kinne, M.D.
Mary B. Kirkbride, Sc.D.
Henrietta Landau, R.N.
W. H. Larkin
Paul A. Lembcke, M.D.
L. G. Levingson
Walter C. Levy, M.D.
Mary C. Lincoln
Harold W. Lyall, Ph.D.
Julia MacPhillips
Mary McCormick
Elizabeth Maltaner
Florence Manley
Agnes E. Maynard
John F. Miller
Winifred Noon
Elizabeth Parkhurst
James E. Perkins, M.D.
James J. Quinlavan, M.D.
Philip J. Raffle, M.D.
Elizabeth Reed
Elizabeth Rennert
Burt R. Rickards
Bertrand E. Roberts, M.D.
Morton Robbins
C. A. Sargent, M.D.
S. W. Sayer, M.D.
Esther N. Schaffer
Edmund C. Schreiner
Josephine C. Secor
Marion W. Sheahan, R.N.
Rhoda Sheldon
Mrs. A. C. Silverman
John O. Spain
Ernest L. Stebbins, M.D.
Hazel I. Stewart
Ray O. Swanner
Robert S. Taggart

F. N. Thomson
Walter von D. Tiedeman
Gladys D. Trotter
Vivian A. Van Volkenburgh, M.D.
A. Wadsworth, M.D.
Mattie M. Washburn
Elizabeth Waterbury
Ruby Wood
Jane D. Nicholson, R.N.
Elizabeth C. Nickerson
John F. Norton, Ph.D.
Dorothy B. Nyswander, Ph.D.
H. R. O'Brien, M.D.
Peter K. Olitsky, M.D.
H. A. Orvis, M.D.
Stanley H. Osborn, M.D.
F. J. Osborne
Anthony J. Pacini, Ph.D.
Charles Paley, B.S.
George T. Palmer, Dr.P.H.
William H. Park, M.D.
Donna Pearce, R.N.
Helen C. Peck, R.N.
C. A. Perry, Sc.D.
Viola G. Pfrommer
J. T. Phair, M.B.
Margaret Phelps
Henry C. Pillsbury, M.D.
R. E. Pleune, M.D.
Charles L. Pool
Alton S. Pope, M.D.
F. M. Pottenger, M.D.
Samuel C. Prescott, Ph.D.
Madge Proctor
Jose Quintini, M.D.
Domingo F. Ramos, M.D.
George H. Ramsey, M.D.
W. S. Rankin, M.D.
Eleanor Rantoul
M. P. Ravenel, M.D.
Lowell J. Reed, Ph.D.
Bertice A. Rees
M. J. Rosenau, M.D.
Evert G. Routzahn
E. H. Ruble
Clara B. Rue
Edith P. Sappington, M.D.
R. R. Sayers, M.D.
Clarence L. Scamman, M.D.
Frank R. Shaw
Marion Simonson
Louise Sitzenstock, R.N.
Mary B. Slattery, R.N.
Harold L. Smith
Harry B. Smith, M.D.
Henry Field Smyth, M.D.
Fred L. Soper, M.D.
Louis Spekter, M.D.
Thomas A. Storey, M.D.
Ruth M. Strang, Ph.D.
George K. Strode, M.D.

Thelma Suggett
 Cynthia Pettee Sweet
 S. C. Tatum, M.D.
 James E. Thomson
 Harry Beal Torrey, M.D.
 Anna B. Towse
 Margaret H. Tracy, A.B.
 Lona L. Trott, B.S.
 Clair E. Turner, Dr.P.H.
 Allan A. Twichell
 Lida J. Usilton, M.A.
 Henry F. Vaughan, Dr.P.H.
 Milton V. Veldee, M.D.
 John E. Vogt
 V. K. Volk, M.D.
 Raymond A. Vonderlehr, M.D.
 Louis A. Voorhees
 Marguerite A. Wales, R.N.

W. F. Walker, Dr.P.H.
 James Wallace, M.D.
 Louis Weiner
 Adolph Weinzirl, M.D.
 William D. Weis, M.D.
 John M. Wheelis, Jr., M.D.
 Nelly K. Whitfield
 Jessamine S. Whitney
 Charles F. Wilinsky, M.D.
 Mary Williams, R.N.
 Pauline Brooks Williamson, B.S.
 Elizabeth Wilson
 Harry F. Wilson, M.D.
 C.-E. A. Winslow, Dr.P.H.
 Frederic A. Woll, Ph.D.
 Abel Wolman, Dr. Eng.
 I. Ogden Woodruff, M.D.
 William P. Yant

HEALTH CONSERVATION CONTESTS

WINNERS OF TENTH ANNUAL CITY HEALTH CONTEST

GROUP I (cities of over 500,000 population), first award, Cleveland, Ohio. Awards of merit in this group go to Buffalo, N. Y.; and Pittsburgh, Pa.

GROUP II (cities of 250,000 to 500,000 population), first award, Providence, R. I. Awards of merit in this group go to Memphis, Tenn.; Louisville, Ky.; Dallas, Tex.; and Cincinnati, Ohio.

GROUP III (cities of 100,000 to 250,000 population), first award, Grand Rapids, Mich. Awards of merit go to Reading, Pa.; Yonkers, N. Y.; and Erie, Pa.

GROUP IV (cities of 50,000 to 100,000 population), first award, Newton, Mass. Awards of merit to Madison, Wis.; and Greensboro, N. C. and Evanston, Ill., tied.

Group V (cities of 20,000 to 50,000 population), first award, Plainfield, N. J. Awards of merit go to Winona, Minn.; Orange, N. J.; and Stamford, Conn.

GROUP VI (cities of less than 20,000 population), first award, Englewood, N. J. Awards of merit go to Hibbing, Minn.; and Virginia, Minn.

In addition, special awards were given to Baltimore, Md.; Brookline, Mass.; Detroit, Mich.; Greenwich, Conn.; Hackensack, N. J.; Hartford, Conn.; Newark, N. J.; New Haven, Conn.; Pasadena, Calif.; Schenectady, N. Y.; and Syracuse, N. Y. Each of these cities has on two or more occasions won first award in its population group and has maintained its previous high standards during 1938.

WINNERS OF THE FIFTH ANNUAL RURAL HEALTH CONTEST

In the Northeastern Division the winner is Cattaraugus County, N. Y. Awards of merit go to Mecosta-Osceola District, Mich.; District 7, Mich. and Saginaw County, Mich., tied; Alger-Schoolcraft District, Mich.; Cortland County, N. Y.; Chippewa County, Mich.; Barnstable County, Mass.; and Berkshire District, Mass.

In the Eastern Division the Winner is Wicomico County, Md. Awards of merit go to Fayette County, Ky.; Mason County, Ky.; Montgomery County, Md.; Jefferson County, Ky.; Scott County, Ky.; Arlington County, Va.; Anderson County, Ky.; Barren County, Ky.; Hamilton County, Tenn.; and Orange-Person-Chatham Health Unit, N. C.

In the Southeastern Division the winner is Charleston County, S. C. Awards of merit go to Lauderdale County, Miss.; Brooks County, Ga.; Berkeley County, S. C.; Macon County, Ala.; and Pickens County, Ala.

In the North Central Division an award of merit goes to Gallatin County, Mont.

In the South Central Division awards of merit go to Dallas County, Tex.; Tyler-Smith County, Tex., and St. Mary's Parish, La.

In the Western Division the winner is Los Angeles County, Calif. Awards of merit go to Wasco County, Ore.; Clallam County, Wash.; Marion County, Ore.; Jackson

County, Ore.; and Spokane County, Wash. and Whitman County, Wash., tied.

Special awards for having won the Rural Health Contest twice in their respective geographical districts and for having maintained their previous high standards of achievement during 1938 go to Davidson County, Tenn.; El Paso County, Tex.; Pike County, Miss., and Shawnee County, Kans.

In the *Canadian Rural Health Contest* the winner is St. Jean-Iberville-Laprairie-Napier-

ville County Health Unit, Quebec. Awards of merit go to Terreboone County Health Unit, Quebec; Rimouski County Health Unit, Quebec; Argenteuil County Health Unit, Quebec; St. James-St. Vital County Health Unit, Manitoba; St. Hyacinthe-Rouville County Health Unit, Quebec; Temiscouata-Riviere du Loup County Health Unit, Quebec; Laviolette County Health Unit, Quebec; Nicolet County Health Unit, Quebec; and Matane County Health Unit, Quebec.

WINNERS OF 1938 SPECIAL CONTESTS

In the 1938 Special Contest for Tuberculosis Control, Hartford, Conn., and Newton, Mass., tied for first place. In addition an

award of merit goes to New Haven, Conn.

In the 1938 Special Contest for Syphilis Control the winner is Louisville, Ky.

SPONSOR OF THE CONTESTS

The City Health Contest is financed by a group of life insurance companies.* The Rural Health Contest is financed by the W. K. Kellogg Foundation of Battle Creek, Mich.

The Contest in Canada is sponsored jointly by the Canadian Public Health Association and the American Public Health Association.

* Life insurance companies financing this health project include:

Bankers Life Insurance Company
Bankers National Life Insurance Company
Berkshire Life Insurance Company
Business Mens Assurance Company
California-Western States Life Insurance Company
Capitol Life Insurance Company
Central Life Assurance Society
Franklin Life Insurance Company
General American Life Insurance Company
Great Southern Life Insurance Company
Guardian Life Insurance Company of America
Liberty National Life Insurance Company
Life and Casualty Insurance Company
Lincoln National Life Insurance Company
Massachusetts Mutual Life Insurance Company
Metropolitan Life Insurance Company
Midwest Life Insurance Company

Two special contests, one on Tuberculosis and one on Syphilis, are carried on in conjunction with the City Health Contest. Awards are made to those competing cities which appear to have the most comprehensive and effective programs for combating tuberculosis and syphilis.

Minnesota Mutual Life Insurance Company
Mutual Trust Life Insurance Company
National Life and Accident Insurance Company
New York Life Insurance Company
Northwestern National Life Insurance Company
Occidental Life Insurance Company
Old Line Life Insurance Company of America
Pacific Mutual Life Insurance Company
Provident Mutual Life Insurance Company
Republic National Life Insurance Company
Reserve Loan Life Insurance Company
Rockford Life Insurance Company
Southwestern Life Insurance Company
Sun Life Insurance Company
Travelers Insurance Company
United Benefit Life Insurance Company
Volunteer State Life Insurance Company
West Coast Life Insurance Company
Western Life Insurance Company

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

- A. J. Butler, M.D., C.P.H., Underwood Ave., Clinton, Tenn., Director, Anderson-Campbell County Health District
 Marshall C. Keith, M.D., State Health Department, Cheyenne, Wyo., State Health Officer
 James A. McCallum, M.D., C.P.H., Centreville, Md., Deputy State Health Officer
 William G. Rinchart, M.D., 211 Commerce Bldg., Pittsburg, Kans., City Health Officer
 Robert C. Strode, M.D., 220 Clifton Ave., Mount Holly, N. J., District Health Officer
 Stamatis G. Velonis, M.D., Nespelem, Wash., Deputy State Health Officer, Colville Indian Reservation
 James F. Worley, M.D., Box 1751, Juneau, Alaska, Senior Surgeon, U. S. Public Health Service, and Medical Director for Alaska, U. S. Indian Service

Laboratory Section

- Jacob M. Coblentz, M.S., 208 Science, Iowa State College, Ames, Iowa, Research Graduate Assistant
 Barton F. Hauenstein, M.D., 2100 City Hall, Buffalo, N. Y., Director of Laboratories, Dept. of Health
 Arthur P. Long, M.D., Dr.P.H., 198 Fair Oaks Park, Needham, Mass., Assistant Director, Division of Biologic Laboratories, Massachusetts Dept. of Public Health
 Theodore Marcus, M.Sc., 6 Columbia Road, Dorchester, Mass., Director, Massachusetts Dairy Laboratories
 Nicholas M. Molnar, M.S., 211 East 19th St., New York, N. Y., Director, Molnar Laboratories, and Director, Stuyvesant Polyclinic Laboratories
 Paul V. Woolley, Jr., M.D., 375 South St., Jamaica Plain, Boston, Mass., Assistant Director, Division of Biologic Laboratories, Massachusetts Dept. of Public Health

Vital Statistics Section

- Alpha K. Kenny, Box 485, Blountville, Tenn.

Public Health Engineering Section

- Ralph M. Davidson, M.S., Weid County Court House, Greeley, Colo., Sanitarian, Weid County Health Unit
 Walter F. Garcia, Wailuku, Maui, Hawaii, Sanitary Inspector, Territorial Board of Health
 Harry K. Gidley, B.S. in C.E., State Health

- Dept., Charleston, W. Va., Associate Sanitary Engineer
 Irving Reichman, B.C.E., 1855 Bogart Ave., New York, N. Y., Water Inspector, City of New York Dept. of Water Supply
 Yale Rosenfeld, B.S., C.P.H., 2207-26th Ave., San Francisco, Calif., Student, University of California
 James G. Terrill, Jr., C.E., Graduate House, Massachusetts Institute of Technology, Cambridge, Mass., Student
 Barringer F. Wingard, B.S., City Hall, Clinton, S. C., Health Officer

Industrial Hygiene Section

- Robert M. Kirk, B.S., 1616 State St., Harrisburg, Pa., Chemist, Division of Industrial Hygiene, Pennsylvania Dept. of Health

Food and Nutrition Section

- Milton L. Laing, M.S., Chemical Laboratory, Armour & Company, Chicago, Ill., Assistant Chief Chemist
 Helen Stacey, M.A., 82 MacDougal St., New York, N. Y., Nutrition Consultant, Henry Street Visiting Nurse Service

Child Hygiene Section

- Robert B. Hightower, M.D., Room 203, District Bldg., Washington, D. C., Assistant Director, School Medical Inspection, Health Dept.

Public Health Education Section

- Clennie E. Bailey, Sc.D., 1235 East 14th Ave., Apt. 32, Denver, Colo., Teacher of Hygiene and Public Health, University of Denver
 George H. Bischoff, M.D., 709 Pueblo, Boise, Idaho, Director, Maternal and Child Health, State Crippled Children's Division
 Mrs. Emily G. Bogert, 581 Gibson St., Akron, Colo., Vice-Commander, Woman's Field Army for Control of Cancer
 Rachel S. Browne, 326 Appleton St., Holyoke, Mass., Executive Secretary, Holyoke Tuberculosis Assoc.
 Mrs. H. Reed Edmunds, Box 467, Leesburg, Fla., Executive Secretary, Lake County Tuberculosis and Health Assoc.
 Milton A. Feinberg, B.S., 411 East 69th St., New York, N. Y., Field Secretary, Committee on Neighborhood Health Development, Dept. of Health
 Arthur H. German, B.Sc., 308 Key Bldg., Oklahoma City, Okla., Executive Secretary,

Tuberculosis Society of Oklahoma City
 A. Harry Ostrow, D.D.S., 203 District Bldg.,
 Washington, D. C., Director of Dental
 Services, District of Columbia Health Dept.
 Edward W. E. Schear, Ph.D., 107 West Park
 St., Westerville, Ohio, Head, Dept. of
 Biology and Geology, Otterbein College

Public Health Nursing Section

Margaret Blee, R.N., University of California,
 Berkeley, Calif., Instructor of Nursing
 Education
 Lilly Harman, R.N., 1923 East Monument
 St., Baltimore, Md., Supervising Nurse,
 Eastern Health District
 Viola Heaton, R.N., 2020 Cornell Road,
 Cleveland, Ohio, Orthopedic Field Nurse,
 State Crippled Children's Service
 Florence V. Illing, R.N., Box 35, St. George,
 S. C., Rural Field Nurse, State Board of
 Health
 Ruth E. Murphy, 523 So. Oak St., Ukiah,
 Calif., Field Nurse, U. S. Indian Service

Epidemiology Section

N. Berneta Block, M.D., Michigan Dept. of
 Health, Lansing, Mich., Public Health Phy-
 sician III, Bureau of Epidemiology
 Ray E. Smith, M.D., Kotzebue Hospital,

Kotzebue, Alaska, Physician, U. S. Indian
 Service

John S. Wheeler, M.D., C.P.H., 116 School
 St., Concord, N. H., State Epidemiologist
 and Director, Division of Local Health
 Work, State Board of Health

Unaffiliated

Robert F. Hall, M.D., 473 Fairfield Road,
 Ypsilanti, Mich., Public Health Trainee,
 University of Michigan
 Kingsley Roberts, M.D., 5 East 57th Street,
 New York, N. Y., Medical Director, Bureau
 of Coöperative Medicine
 Henry Perry, Beaver Falls, N. Y., Chief
 Chemist, J. P. Lewis Company
 Bertha Shafer, M.D., 9 East Huron St.,
 Chicago, Ill., Director, Illinois Social
 Hygiene League

DECEASED MEMBERS

Alfred Larson, M.D., Ph.D., Youngstown, O.,
 Elected Member 1912
 A. C. Shamblin, M.D., Cartersville, Ga.,
 Elected Member 1930
 Edward J. Howland, M.D., Colchester, Conn.,
 Elected Member 1933
 Wendell A. Jones, M.D., Riverside, Calif.,
 Elected Member 1935

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge.

Replies to these advertisements, when keyed, should be addressed to the American Public Health Association, 50 West 50th Street, New York, N. Y., identifying clearly the key number on the envelope.

POSITIONS WANTED

HEALTH OFFICERS

Unusually well qualified and experienced administrator; M.D., Johns Hopkins; M.P.H., Harvard; with broad experience in administering programs of medical care; is available. A404

Physician; M.D., Class A medical school; M.S.P.H., University of Michigan, 1937; now serving as district state health officer; seeks full-time city or city-county administrative position. A367

Well qualified physician; with C.P.H. from Johns Hopkins; experienced as school physician and in college teaching; will consider city or county administrative position or teaching and student health. A383

Physician; M.D., Vanderbilt University; Dr.P.H., Johns Hopkins; experienced as epidemiologist, health officer and professor of preventive medicine; seeks position as administrator or epidemiologist. A397

Physician, aged 30; M.D., University of Illinois; C.P.H., University of California; experienced as instructor in medicine and director of state Division of Epidemiology; desires position in communicable disease control or administration. A399

Physician; M.D., C.P.H.; 2 years' experience as district health officer; prefers to do venereal disease control work or epidemiology. A345

Well qualified physician, completing course in public health at University of Michigan, with special interests in tuberculosis and venereal disease control, seeks responsible appointment. Excellent references. A406

Physician; M.D., University of Minnesota, 1927; M.S., Columbia University, 1937; special training in tuberculosis and venereal disease, and administrative experience in CCC camp; wishes position as health officer. A407

Physician; M.D., Yale; M.S.P.H., Columbia; also short course for Health Officers, Vanderbilt; good clinical background; one year public health experience; will consider appointment in child health, epidemiology or public health administration. A350

Physician; M.D. degree from Class A medical school. Two years' internship in large city hospital; 14 years' general practice be-

fore entering public health activities; 12 years' full-time public health experience. Employed now with state department of health. Will consider opening with well organized city or state department in communicable disease division or epidemiology or both. Mid-west preferred. A409

Physician, M.D., class A medical school, M.S.P.H., University of Michigan, 1939. Ten years' experience in administrative full-time health programs. Seeks position in public health administrative position. A373

HEALTH EDUCATION

Health educator with excellent background of teaching experience in schools; M.S.P.H. from the University of Michigan in June; wishes a position where skill with educational sound film projection and other recognized technics will be appreciated. H405

Experienced director of health education, R.N. and college graduate, with excellent references, will consider health education or promotional position in the East. A408

LABORATORY

Physician; M.D., Northwestern; Dr.P.H., Johns Hopkins; broad experience in laboratory, teaching and epidemiological fields; will consider temporary position for summer, beginning in May, preferably in parasitology. M293

Physician; C.P.H., Harvard-Technology; experienced as bacteriologist and pathologist and director of state laboratories; desires position. L208

Experienced bacteriologist, Ph.D., 1934, with teaching in research background, particularly in relation to sanitation, seeks position as director of laboratory or teacher. L370

Experienced woman bacteriologist, Ph.D., University of Illinois 1937, wishes position in teaching or research. Excellent bibliography and references. L410

Bacteriologist, M.S. degree, experienced in university teaching, testing antiseptics, bacterial food poisoning, and industrial products, desires a laboratory or allied position. L411

Chemist and bacteriologist experienced in water supply, sewage, and public health

laboratory work. Five years' experience. B.S. 1933. Desires work in sanitation or general public health. L412

Chemist and Bacteriologist, B.Sc.; A.B.; B.S. in Ed.; M.S.P.H. from University of Michigan. Experience in field work as chemist. Serology training under Dr. Kahn at Ann Arbor, Mich. Three years' experience in public health laboratory work. Will consider position in public health field. L415

MATERNAL AND CHILD HEALTH

Woman physician, with excellent medical training and background of public health nursing experience, seeks position in maternity and infancy work. C376

Woman physician, graduate of University of Iowa, who has directed state bureau of maternal and child health, now employed, will consider another position. C318

ENGINEERING

Public Health Engineer, B.S. in Sanitary Engineering, University of California, 1937. Now completing training for C.P.H. in Public Health Engineering, University of California. Well trained in all phases of sanitation and other public health activities, including epidemiology, public health administration, health education, etc. Desires position as sanitary or public health engineer in municipal, county or state health department. E413

MISCELLANEOUS

Experienced librarian in the medical field, with knowledge of the literature, languages, editing, abstracting and reference work, desires position in research or editorial department of a public health organization. Available in the fall. M414

Situations Wanted

PUBLIC HEALTH PHYSICIAN—B.S., M.D., degrees eastern schools; CPH, Johns Hopkins School of Hygiene; five years, chief epidemiologist State Department of Health; for further information please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

PUBLIC HEALTH NURSE—Graduate of a small school; graduate courses in pediatrics and communicable diseases; nine months' postgraduate training in public health nursing, Western Reserve; several years' successful hospital experience (supervising and executive); five years, public health nursing; for further information please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

BACTERIOLOGIST—A.B., M.S., degrees, state university; ten years, city bacteriologist and chemist, city health department; for further information please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

SOCIAL WORKER—B.A. and M.A. degrees; two years' graduate training, eastern school of social service work; two years, case worker in family department of Catholic charitable organization; field work was served in medical social service; has ability to carry responsibilities; for further information please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

Situations Open

WANTED—Director of Health; physician; graduate recognized school of public health, with year's practical experience in public health field; beginning salary \$4,000; wealthy residential community, New England. No. PH-55, Medical Bureau, Pittsfield Building, Chicago.

WANTED—Public health nurse to assist supervisor of nurses, municipal public health department; midwest. No. PH-50, Medical Bureau, Pittsfield Building, Chicago.

WANTED—Registered nurse with college degree who has emphasized public health work; small southeastern college; \$125, maintenance. No.

PH-51, Medical Bureau, Pittsfield Building, Chicago.

WANTED—Graduate nurse-technician; college infirmary; 8-hour day, 5½ day week; month's paid vacation; \$1200–\$1400; midwest. No. PH-52, Medical Bureau, Pittsfield Building, Chicago.

WANTED—Qualified public health physician for immediate appointment as district health officer, midwestern state. No. PH-53, Medical Bureau, Pittsfield Building, Chicago.

WANTED—High school nurse, with degree, public health training; 5-day week, regular teaching hours; Chicago vicinity. No. PH-54, Medical Bureau, Pittsfield Building, Chicago.

NEWS FROM THE FIELD

THE NATIONAL HEALTH ACT OF 1939

A SUMMARY OF THE WAGNER BILL BEFORE THE U. S. CONGRESS

SENATOR Robert F. Wagner of New York has introduced the National Health Act of 1939 (S. 1620). The following is a summary of the main provisions of the Bill:

The National Health Act is intended to implement with concrete legislation the recommendations developed out of a 5 year inquiry recently reported by the Inter-departmental Committee to Coördinate Health and Welfare and other federal agencies.

The Bill utilizes the procedure of grants-in-aid from the federal government, familiar in various titles of the Social Security Act, which provides latitude to the states in the development of their own plans. In this Bill grants are made available for the purpose of establishing, expanding, and approving state programs for child and maternal health, for general public health and investigation, for the construction of needed hospitals and health centers, for general programs of medical care, and for insurance against loss of wages during periods of temporary disability. Federal administration is broken up between the Children's Bureau, the Public Health Service, and the Social Security Board.

Contrary to a general impression, there is no provision in the Act authorizing the federal government to furnish medical care. Administration in all cases is to be through the states, with a view to supplementing the existing efforts of the professions, the localities, charitable organizations, and hospitals. The Bill does not establish

a system of health insurance or require the states to do so. However, the states will be free to develop plans of their own choosing, subject to the establishment of necessary basic standards. Plans for medical care may be limited to those on relief or they may include others more fortunately situated and may be paid for by insurance contributions, by general revenue, or both. The method and scope of medical services are for the states to determine and they may include services rendered through existing private agencies or institutions.

Provision is made for participation by the federal government only where there is financial participation by the state. The state must provide either a state-wide program at the outset or plans for extension so that the program will be in effect in all political subdivisions of the state in need of the services not later than June 30, 1945. Except for the grants for disability compensation, the administration of the plan is to be by the state health agency, or at least there is to be supervision by the state health agency of any part of the plan administered by another state agency or by a political subdivision of the state.

The federal administrative officers may require the states to establish personnel standards on a merit basis and methods of establishing and maintaining standards of medical and institutional care and of remuneration for such care to be prescribed by the state agency after consultation with profes-

sional advisory committees. At each stage of state and federal administration provision is made for consultation with professional advisory councils composed of members of the professions and agencies, public and private, that furnish the particular services.

Federal grants are made available for the professional training of administrative and technical personnel. It is also required that the states provide for necessary working agreements between state administrative agencies concerned with various aspects of social insurance, public assistance, workmen's compensation, vocational rehabilitation, industrial hygiene and education.

The new appropriations authorized in the first year for all phases of the program, including the administrative costs, aggregate approximately \$80,000,000, exclusive of amounts which may be appropriated by Congress for aiding the states in the construction of needed tuberculosis and mental hospitals. This sum under the Bill will be gradually increased over a 10 year period and will be available to match sums appropriated by the states toward the cost of their respective programs. No new federal payroll taxes are authorized.

In order to make the available funds serve the interest of those localities which are in greatest need of the services, the Bill authorizes grants on a variable matching basis, depending on the relative financial resources of the several states, as determined by the per capita income of their inhabitants. The

federal grants will vary from $33\frac{1}{3}$ per cent to $66\frac{2}{3}$ per cent of the total sums expended by the states for various programs of public health and hospital construction. For programs of medical care, the matching ratio varies from $16\frac{2}{3}$ per cent to 50 per cent of total state expenditures. The intent of this provision is to raise the general level of health protection throughout the country, while reducing the existing wide variations among the states, and especially as between rural and urban areas.

In addition to various preventive and curative health services, the Bill authorizes grants-in-aid to states in establishing insurance plans providing cash benefits during periods of temporary disability. These insurance systems would protect the wage earner against an annual wage loss through disabling illness estimated to be more than \$1,000,000,000 per year. Federal grants for this purpose are authorized at a fixed matching ratio of $33\frac{1}{3}$ per cent of the total expenditures by the states.

Under this Bill the Children's Bureau is charged with the administration of grants for maternal and child welfare and for services to crippled and other physically handicapped children. The Public Health Service is charged with the administration of grants for general public health work and investigations and for hospitals and health centers. The grants for medical care and for disability compensation are to be administered by the Social Security Board.

SUMMER SCHOOL COURSES IN PUBLIC HEALTH

While the following list does not show all universities and technical schools offering summer courses in public health, it represents those who have replied to a questionnaire sent out by the American Public Health Association.

American National Red Cross

Courses in Teacher Training for Home Hygiene Instruction:

University of California, Los Angeles,
Calif.—June 26–August 4
Colorado State College, Fort Collins,
Colo.—July 8–August 18
Peabody College, Nashville, Tenn.—June
12–August 25

University of California, Berkeley, Calif.

June 26–August 4

General Bacteriology
Child Development
Physiology of the Growth and Development
of Children
Administration of the School Health Pro-
gram
Child Psychology
Nursing and Social Problems in the Con-
trol of Syphilis and Gonorrhea—3 weeks'
institute, June 26–July 14—under aus-
pices of University of California and the
State Department of Public Health
Introduction to Educational Psychology
General Psychology
Elementary Epidemiology *
Elementary Public Health *
Applied Hematology and Other Diagnostic
Procedures *

* These four courses are offered in the Inter-
session, May 15–June 23

University of California at Los Angeles, Los Angeles, Calif.

June 26–August 4

Elementary Bacteriology
Growth and Development of the Child
Adolescence
Child Guidance
Mental Hygiene
The Nursery School
Administration of the School Health Pro-
gram

Administration, Supervision, and Teaching
of Sight-Saving Classes
Recreational Leadership
Physiology of Exercise
Principles of Teaching as Applied to Home
Hygiene Courses
Methods in Teaching Home Hygiene
Courses with Practice Teaching
Essentials of Nutrition
Family Relationships
General Psychology
Child Psychology
Educational Psychology
Materials for Health Instruction in the
Secondary School
Public Health and Preventive Medicine
Principles and Practice of Public Health
Nursing
Social Case Work as Related to Public
Health Nursing
General Human Physiology
General Zoölogy
Psychological Adjustment
Social Pathology

The Catholic University of America, Washington, D. C.

June 30–August 12

Child Study
Nursing Education
Public Health Nursing
Social Work
Sociology

Teachers College, Columbia University, New York, N. Y.

June 5–27

Curriculum in Health Education
Field Work in Health Education
Health Service in Schools

July 5–August 11

Administration of Health Education in Pub-
lic Schools: Principles and Special
Problems in Health Education;
Methods and Materials of Health In-
struction in Schools and Colleges

Child Hygiene
 Health Education
 Health and Physical Education
 Recreation
 Health Care of Children
 Home and Community Hygiene
 Nutrition and Health
 Personal and General Hygiene
 Public Health Nursing
 Public Health Administration
 School Hygiene
 School Nursing

Education of the Handicapped:
 Demonstration Classes
 Observation, Practice Teaching, and Clinical Work
 Survey of Ear, Orthopedic, Cardiac, and Certain Tuberculous Conditions, and of Certain Types of Malnutrition
 Education of the Blind and Partially Seeing (beginning and advanced courses)
 Education of the Deaf (advanced courses only), and of the Hard of Hearing (beginning and advanced courses)
 Education of the Crippled and Other Motor Handicapped
 Education of the Mentally Handicapped
 Education of the Socially Handicapped
 Speech Correction
 Psychology of Physically Handicapped Children
 Music and Rhythms for the Handicapped
 Physical Education for the Physically and Mentally Handicapped

Cornell University, Ithaca, N. Y.

July 3–August 12

Health Education:
 The School Health Program
 Mental and Physical Health Problems of the School Child
 Mental Hygiene

University of Denver, Denver, Colo.

June 19–August 25

Conference on Health and Physical Education, July 11, 12, 13

Duke University, Durham, N. C.

June 12–July 22

Materials and Methods in Health Education
 Mental Hygiene of the School Child
 Personal and School Hygiene

Harvard University—Medical School, Boston, Mass.

June 19–August 5

Physiotherapy (course for graduates)

The University of Hawaii, Honolulu, Hawaii

June 26–August 4

Health of the School Child
 Organization and Administration of Health and Physical Education
 Health Education in the Public Schools

University of Illinois, Urbana, Ill.

June 19–August 12

Agricultural Engineering:
 Drainage and the Mechanics of Soil and Water Conservation

Bacteriology:
 Food and Applied Bacteriology

Entomology:
 How Insects Live and Their Importance to Mankind

Home Economics:
 Nutrition
 Dietetics
 Foods
 Organization and Management of the Home

The Child and His Development

Physical Education for Men:

Physical Education
 Problems in Physical Education
 Problems in School Health
 Safety Education
 Training and First Aid

Physical Education for Women:

Physical Education
 Physical Education Program for the High School
 Playground Activities for Elementary Schools
 Health Education in the High School

Sociology:
 Community Welfare Organization

State University of Iowa, Iowa City, Iowa

June 12–August 4

Hygiene
 Nursing
 Nutrition
 Physical Education

University of Kentucky, Lexington, Ky.

June 12–August 5

Health Officers:
 Epidemiology
 Public Health Administration
 Vital Statistics
 Public Health Records
 Maternal and Child Health

Mental Hygiene
 County Health Practice
 Public Health Bacteriology
 Chemistry of the Vitamins
 Contemporary Problems in Political Science
 Sanitary Engineering
 Public Health Nurses:
 Public Health
 Public Health Nursing
 Deficiency Diseases and Nutrition
 Social Work Information
 Elementary Psychology
 Sanitarians:
 General Bacteriology
 General Animal Biology
 Mechanical Drawing
 Communicable Diseases
 Sanitary Engineering

Loyola University, Chicago, Ill.

June 26–August 5

Public Health Nursing in Special Fields
 Applied Public Health Nutrition
 Physiologic Hygiene
 Methods and Materials in Health Education
 Principles of Public Health Nursing
 Principles of Social Case Work as Applied to Public Health
 School Health Problems
 Principles of Sociology
 Educational Psychology
 Mental Hygiene (3 courses)
 Eye Hygiene and Oral Hygiene

Massachusetts Institute of Technology, Cambridge, Mass.

Bacteriology (July 3–July 21)
 Public Health Bacteriological Methods (June 12–July 21)
 Food Technology (Sept. 5–Sept. 22)
 Modern Biology (June 26–August 4)

Massachusetts State Teachers College, Hyannis, Cape Cod, Mass.

(Sponsored by the Division of Child Hygiene of the Massachusetts Department of Public Health, in coöperation with the State Department of Education)

July and August

Source Materials for the Development of a School Health Program
 Principles and Methods of Teaching Health Prevention and Correction of Reading Difficulties

Michigan State College, East Lansing, Mich.

June 19–July 28

General Bacteriology
 Medical Biology Courses
 Pathological Bacteriology
 Personal Hygiene
 Sanitary Science
 Physical Education Departments offer the following courses:
 School Health Problems
 First Aid

University of Michigan, Ann Arbor, Mich.

June 26–August 5

Child Hygiene
 School Health Problems
 Principles of Public Health Nursing
 Administration and Organization of Public Health Nursing
 Applied Nutrition
 Methods and Materials of Health Education
 Mental Hygiene
 Supervision of Public Health Nursing
 Physiologic Hygiene
 Communicable Diseases and Epidemiology
 Public Health Statistics
 Public Health Law and Administration
 Sanitation
 Industrial Hygiene

August 14–26

National Institute for Traffic Safety Training

University of Minnesota, Minneapolis, Minn.

First Term, June 19–July 28;
 Second Term, July 31–September 1

Public Health Nursing Courses

First Term:

Elements of Preventive Medicine and Public Health
 Nursing and Social Problems in the Control of Gonorrhea and Syphilis
 Tuberculosis and Its Control
 Field Practice with Family Health Agency
 Public Health Administration and Field Work
 Public Health Administration—General Research
 Special Methods and Supervised Practice in Health Teaching

Courses in Biometry:

Biometric Principles
Topics in Biometry

Second Term:

Health of the School Child
Tuberculosis and Its Control
Principles of Public Health Nursing
Public Health Administration and Field Work
Research

National Society for the Prevention of Blindness, 50 West 50th Street, New York, N. Y.

(in coöperation with the following colleges and universities)

Courses for the Training of Teachers and Supervisors of Sight-saving Classes:

Western Reserve University, Cleveland Ohio

June 19–July 28

State Teachers College, Buffalo, N. Y.

June 26–August 4 (dates tentative)

State Teachers College, Milwaukee, Wis.

June 26–August 4

University of California, Los Angeles, Calif.

June 26–August 4

Wayne University, Detroit, Mich.

June 26–August 4 (elementary and advanced courses)

University of New Mexico, Albuquerque, N. M.

July–August

Social Hygiene

Methods and Materials in Health Education
Hygiene of Adult Life, Degenerative Diseases

New York University, New York, N. Y.

July 5–August 11

Course of six weeks, preparing for reconstruction work with the physically handicapped.

Summer course, to be given at New York University Camp, Sloatsburg, N. Y., under the auspices of New York University, Summer Session of the School of Education.

Information can be secured from Dr. Walter J. Craig, Director of the Division of Orthopedics, New York State Department of Health, and from New York University, New York, N. Y.

New York University, New York, N. Y.

Intersession: June 5–30

Summer Session: July 5–August 11

Nursing Education:

Administration of Public Health
Organization of School Nursing
Teaching of Home Nursing and Home Hygiene
Principles of Public Health Nursing
Applied Nutrition for Health Supervisors
Care of Mothers and Infants
Teaching in Nursing Education
Psychology of Childhood—Adolescence
Child Hygiene
Principles and Practices in First Aid

Northwestern University, Evanston, Ill.

June 19–August 12

Teaching Rhythms to Children

Foundations of a Philosophy of American Recreation

Administering the Physical Education Program for Health

Preventive and Corrective Physical Education

Eye Health of the School Child

Seminar in Eye Health in Teacher Education

Rutgers University, New Brunswick, N. J.

July 5–August 16

Public Health Practice

Principles of Public Hygiene

Smith College—School for Social Work, Northampton, Mass.

July 5–August 30

Medical Information

Stanford University, Stanford University, Calif.

June 22–September 2

Physical Education and Hygiene

Syracuse University, Syracuse, N. Y.

July 5–August 11

Principles of Public Health Nursing

Maternity and Child Hygiene

Special Fields in Public Health Nursing

Public Health and Statistics

Case Studies in Public Health Nursing

Ward Management

Teaching of Nursing Arts

Psychology (Child, Adolescent, Educational)
Nutrition
Hygiene Methods

Temple University, Philadelphia, Pa.
Teachers College—Department
of Physical and Health Educa-
tion

June–July

Administration of Health Education

University of Tennessee, Knoxville,
Tenn.

June 12–July 19

Bacteriology
Water Supply
Child Psychology
Home Nursing
Nutrition
School Lunchroom Management
Personal Hygiene—Group Hygiene
Public Health Education

July 20–August 24

School and Mental Hygiene
Water Supply
Nutrition
Child Guidance
Young Child and His Family
Public Health Education

University of Utah, Salt Lake City,
Utah

June 12–July 21

Bacteriology
Biology
Chemical Research
Problems in Child Development
Guidance and Personnel in Secondary
Schools
Physical Education and Hygiene
Home Economics
Social Work
Home Nursing
Introduction to Public Health
Personal Health and Its Teaching
Principles of Child Welfare

Vassar College, Poughkeepsie, N. Y.

June 29–August 9

Institute of Euthenics:
Special Work in Guidance and Science
(for secondary school teachers)

University of Virginia, University, Va.

June 19–July 29

Hygiene and Sanitation

Wagner College, Staten Island, N. Y.

July 5–August 15

Bacteriology
Applied Bacteriology
Serology
Clinical Pathology
Seminar in Medical Technology

Washington University, St. Louis, Mo.

June 16–July 28

Education
Natural Sciences
Psychology
Sociology and Social Work

University of Washington, Seattle,
Wash.

June 19–July 19 (First Term)

July 20–August 18 (Second Term)

Diagnostic and Remedial Work in Educa-
tion
Behavior as an Expression of Health
Nutrition
Bacteriology
Organization, Administration, and Tech-
niques in Special Fields of Public Health
Nursing
Public Health Administration and Epi-
demiology
Readings in Specialized Fields of Public
Health Nursing
Principles of Teaching Nursing and Health
Principles of Health Education
Methods and Materials in Health Teaching
Symposium in Health Education
Public Health Program

Wayne University, Detroit, Mich.

June 26–August 4

Psychology
Sociology

University of West Virginia, Morgan-
town, W. Va.

June 12–August 26

First Term:

Problems in Health and Physical Educa-
tion
Tests in Health and Physical Education
Advanced Public-School Health
Seminar in Health and Physical Education

Second Term:

Problems in Health and Physical Education

Tests in Health and Physical Education

Seminar in Health and Physical Education

Western Reserve University—School of Applied Social Sciences, Cleveland, Ohio

June 19–July 28

Public Health Nursing:

Practical Sociology

Public Welfare

Rural Communities

University of Wisconsin, Madison, Wis.

June 26–August 4

Curriculum in Physical Education for Junior and Senior High School Girls

First Aid and Safety Education

Health Education in Schools

Human Anatomy

Medical Bacteriology

Physical Examinations and Therapeutics

Play, Recreation and Leisure Time Problems

Physical Therapy

School Health and Hygiene

Tests and Measurements in Physical Education

Therapeutic Gymnastics

Organization and Administration of a City Recreation Program

Organization of the Extra-curricular Physical Education Program in the Public Schools

Physical Education for Junior and Senior High School Girls

FOREIGN

Carlo Forlanini Institute, Rome, Italy

July 15–October 15

Course of Phthysiology (under direction of Professor Eugenio Morelli)

Ettore Marchiafava Institute of Malariology, Rome, Italy

July 24–September 20

International Malaria Course for 1939 (under direction of Professor Giuseppe Bastianelli)

[For information on these two courses, write to the Medical & Health Dept., I.R.C.E., Via Lazzaro Spallanzani 1A, Rome.]

NATIONAL CONFERENCE FOR COÖPERATION IN SCHOOL HEALTH EDUCATION

RECOGNITION of the opportunities for developing more comprehensive and better coördinated programs of school health education throughout the United States culminated in a 2 day conference of some 70 delegates of 40 national organizations at Rockefeller Center, New York, N. Y., in November, 1938. Preliminary plans for the conference were developed by representatives of the National Education Association, the U. S. Public Health Service, the American Social Hygiene Association, and the National Health Council. Reports from delegates gave a colorful picture of the variety of ways that different organizations operate, of the wealth of diversified services, of the many groups served, and of the difficulties which hinder full attainment of objectives.

Members of the conference stressed the importance of health education in the entire community and the desirability of interrelating school health education and public health education. There are many national health and educational agencies already well organized for service in the health field. From this preliminary conference there resulted a plan for the organization of a National Conference for Coöperation in School Health Education. "To meet more effectively the recognized needs of the schools . . . for making the resources of all agencies more readily available through coördination of efforts."

An executive committee is in the process of organization, and operating codes have been tentatively drawn for the guidance of the executive committee and of the National Conference to be composed of representatives selected by the national agencies represented at

the first Conference and others to be added. These plans will be submitted in the near future for the consideration of the participating agencies. The chairman of the Conference during these stages of organization is Professor Ira V. Hiscock of Yale University, President of the National Health Council; and the secretary is Dr. N. P. Neilson, Executive Secretary of the American Association for Health, Physical Education and Recreation, a department of the National Education Association.

WPA TO BUILD HEALTH DEPARTMENT LABORATORIES IN ILLINOIS

ACCORDING to a recent announcement, 20 laboratories will be constructed by the WPA for the Illinois State Department of Health.

Subject to federal approval, the laboratories will be situated where facilities are inadequate and will not compete with or duplicate existing public or private laboratories. They are not to be used for treatment.

PACIFIC SCIENCE CONGRESS

THE National Research Council has announced that the Sixth Pacific Science Congress will be held under its auspices in San Francisco and vicinity between the dates July 24 and August 12.

Certain of the sessions will be held on the grounds of the Golden Gate International Exposition, certain on the campus of Stanford University near Palo Alto and certain sessions on the University of California campus at Berkeley. The meetings of the Western Branch of the American Public Health Association will be held during part of this period, July 23-28, in Oakland.

Dean Charles B. Lipman of the University of California, Berkeley, is the Chairman of the Committee of the Pacific Science Congress.

ROBERT WILLIAM PHILIP

THE February issue of *Tubercle* carries a notice of the death of Robert William Philip.

"The death of Sir Robert Philip marks an epoch in the history of the anti-tuberculosis campaign. He must surely be regarded as a leader in a public health crusade."

Lady Philip died suddenly in Edinburgh within a month of her husband's death.

RED CROSS MEDICAL ADVISORY COMMITTEE ON HEALTH ACTIVITIES

CREATION of a Medical Advisory Committee to the American Red Cross is announced by Chairman Norman H. Davis.

Dr. Livingston Farrand of New York, who was chairman of the Central Committee of the American Red Cross from 1919 to 1921, has accepted chairmanship of the new committee. Other members are:

Dr. Thomas Parran, Surgeon General of the United States Public Health Service

Dr. Waller S. Leathers, Dean of the Medical School of Vanderbilt University, Nashville, Tenn.

Dr. David P. Barr, Professor of Medicine, Washington University School of Medicine, St. Louis, Mo.

Dr. Martha M. Eliot, Assistant Chief of the Children's Bureau, Washington, D. C.

Rear Admiral Ross T. McIntire, Surgeon General of the U. S. Navy

Major General Charles R. Reynolds, Surgeon General of the U. S. Army

Dr. Edwards A. Park, Pediatrician-in-Chief of Johns Hopkins Hospital, Baltimore, Md.

PENNSYLVANIA REQUIRES CANCER AND DIABETES CASES REGISTERED

A NEW regulation requiring the registration of cancer and diabetes cases has been announced by the Pennsylvania State Health Department.

These two diseases must be reported in the same manner as communicable diseases, and results of treatment, if any, must be included in the report.

VOCATIONAL GUIDANCE FOR PUBLIC
HEALTH NURSES

THE Nursing Bureau of Manhattan and Bronx, Inc., New York, N. Y., opens a vocational-placement service to public health nurses and the field on May 1, 1939. The service has the tentative approval of the Committee on Vocational Counseling of N.O.P.H.N. Full approval is dependent upon analysis of the service in action.

Letha Allen, R.N., formerly Director of the Public Health Nursing Organization of Eastchester, Tuckahoe, N. Y., has been appointed Secretary of Public Health Placements. The Nursing Bureau of Manhattan and Bronx, Inc., has been conducting a placement-vocational service for private practice and institutional nurses since 1933. The service to public health nurses and nursing organizations is now added because a need for it in New York City was created when the public health nursing service rendered by Joint Vocational Service in New York City was transferred last July to the Nurse Placement Service in Chicago.

All grades of positions will be handled, the service covering the entire United States.

TEACHING HEALTH CENTER AT
COLUMBIA UNIVERSITY

THE opening of the new laboratories and classrooms of the De Lamar Institute of Public Health at the Presbyterian Columbia Medical Center, 168th St. and Broadway, New York, N. Y., has been announced by Dean Willard C. Rappleye, Dean of the Columbia University College of Physicians and Surgeons. The building has been erected through an agreement between the Presbyterian Hospital, Columbia University, and the New York City Department of Health and will serve the Washington Heights and Riverside Districts of the Borough of Manhattan.

This building is one of five similar health centers in New York City through which the health department will provide facilities whereby medical students can participate actively in all phases of public health work, including epidemiology, nursing service, supervision of school children and coöperation with social welfare agencies.

The first four floors of the center will be used by the city as headquarters for maternal care, child welfare, nursing and other public health services. Upper floors will include equipment for the institute and will contain a model classroom with provisions for controlling temperature, volume, humidity, the character of dust and the bacterial content of the air.

BIOLOGICAL ABSTRACTS

ANSWERING the demand from many scientists, *Biological Abstracts*, beginning with the January, 1939, issue, has been separated into individual sections, so that persons may now subscribe to whichever sections interest them. In addition, the complete form will continue to be published. Section C—*Abstracts of Microbiology, Immunology and Parasitology*, which will be of most interest to public health workers, includes immunology, bacteriology, viruses, parasitology, protozoology and helminthology. The index to the complete volume is included with each section.

INCUBATOR SERVICE

INCUBATOR service for premature infants has been inaugurated at the Red Hook-Gowanus Health Center of the New York City Health Department. As part of the program to lower the infant death rate, four portable incubators have been purchased, and letters have been sent to physicians residing in this district informing them of the service.

PERSONALS

Central States

FILIP C. FORSBECK, M.D.,* formerly Associate Director of the Michigan Bureau of Communicable Disease, Lansing, has entered the Reserve Corps of the U. S. Public Health Service with the rank of surgeon. He will be stationed in Cincinnati where he will be engaged in work on the epidemiology of gastroenteritis, complementing the work of the Stream Pollution Investigations Station. Dr. Forsbeck is Secretary of the Epidemiology Section of the A.P.H.A.

C. D. HART, M.D., C.P.H.,* Director of District Department of Health No. 6, Newberry, Mich., has been appointed Health Officer of the City of Savannah, and Chatham County, Ga.

DR. JOHN A. MCINTYRE has been appointed Health Officer of Owatonna, Minn., succeeding the late Dr. JEROME F. SMERSH.

DR. DENNIS M. O'DONNELL has been appointed Health Officer of Ortonville, Minn.

Eastern States

LIEUTENANT-COLONEL A. P. HITCHENS, M.C., U.S.A.,* now assigned to the University of Pennsylvania Medical School, Philadelphia, has been appointed by permission of Secretary Woodring, of the War Department, as George S. Pepper Professor of Public Health and Preventive Medicine at the University of Pennsylvania. For the present Dr. Hitchens will be in charge of the undergraduate and graduate teaching in Public Health and Preventive Medicine, in addition to the courses in Military Medicine.

DR. JOHN J. SHAW, of Philadelphia, Pa., has been appointed State Sec-

retary of Health of Pennsylvania, to succeed Dr. EDITH McBRIDE-DEXTER.

DR. GEORGE S. STEVENSON has been appointed Medical Director of the National Committee for Mental Hygiene, New York, N. Y. He succeeds Dr. CLARENCE M. HINCKS, who has asked to be relieved of his duties except as part-time Field Consultant, in order to give more time to the work of the National Committee for Mental Hygiene of Canada, of which he is the General Director and Founder.

DR. ALEXANDER HAMILTON STEWART, of Indiana, Pa., has been appointed Deputy Secretary of Health of Pennsylvania.

Southern States

LIVINGSTON L. BLAIR, of Washington, D. C., has been appointed Assistant National Director of the Junior Red Cross.

DR. JOHN W. DABBS, of Geneva, Ala., has been appointed Health Officer of Geneva County, succeeding Dr. WALTER J. BROAD, who has resigned to accept a position in the Division of Venereal Diseases, Alabama State Department of Health.

DR. ROBERT H. HIGHTOWER, who has been instructor in pediatrics under the auspices of the department of clinical and medical education of the Medical Society of Virginia; has resigned to accept a position as Assistant Director of School Medical Inspection in the District of Columbia.

JOSEPH A. MORRIS, M.D.,† of Franklinton, N. C., recently retired as Health Officer of Granville County, after about 20 years of service.

DR. BALLARD L. NORWOOD, Jr., now serving at a CCC camp at Greenwood, S. C., has been appointed Health Officer of Granville County, N. C., to succeed JOSEPH A. MORRIS,

* Fellow A.P.H.A.

† Member A.P.H.A.

M.D.,† resigned. Dr. Norwood will take a course in public health at the University of North Carolina before assuming the position July 1.

DR. HENRY E. SIGERIST, Director of the Institute of Medicine, Johns Hopkins University School of Medicine, Baltimore, Md., will lecture during August, September, and October in universities of the Union of South Africa, under a visiting lectureship.

Western States

DR. EDWIN L. BRUCK has been appointed a member of the advisory council to the San Francisco Department of Health, San Francisco, Calif., succeeding DR. WILLIAM C. VOORSANGER.

JOHN M. COLLINS, M.D.,† Seattle, Wash., Acting Health Officer, King County, Wash., resigned March 24, 1939, to accept appointment as First Lieutenant, Medical Corps, Regular Army.

DR. WENDELL H. HUTCHENS, of Portland, Ore., was recently appointed a new member of the Oregon State Board of Health.

DR. CORNELIUS MARTIN MILLS, of Oakland, Calif., has been appointed Chief of the Crippled Children's Services of the California State Department of Public Health. He will have charge of the Department's activities under the California Crippled Child Act and those for the relief of the physically handicapped made possible through the provision of social security funds.

FREDERICK D. STRICKER, M.D.,* of Portland, Ore., was elected Executive Secretary and State Health Officer of the State Board of Health at a recent meeting.

DR. HARVEY A. WOODS, of Ashland, Ore., was appointed a new member of

the Oregon State Board of Health.

Canada

JOHN J. HEAGERTY, M.D., D.P.H.,† Chief Executive Assistant of the Department of Pensions and National Health, Ottawa, Ont., has been appointed Director of Public Health Services of Canada.

Foreign

DR. ROBERTO BACHI, medical statistician and economist, formerly professor of Economics at the University of Rome but now exiled from Italy, has been appointed to the staff of the new Medical Center on Mt. Scopus, Jerusalem, Palestine.

DR. EMILIO ENRICO FRANCO, former Professor of Pathological Surgery and Anatomy at the Royal University of Pisa, exiled from Italy, has been appointed to the staff of the new Medical Center on Mt. Scopus, Jerusalem, Palestine.

DR. LUDWIG HALBERSTAEDTER, exiled from Italy, has become associated with the Hadassah Medical Organization in Palestine, Jerusalem.

PROFESSOR BERNHARD ZONDEK, co-discoverer of the Ascheim-Zondek test, is exiled from Italy, and has become associated with the Hadassah Medical Organization in Palestine, Jerusalem.

DEATHS

DR. JAMES MORSELL GASSAWAY, Senior Surgeon, retired, of Cairo, Ill., died March 5, at the age of 91. He was the oldest member of the U. S. Public Health Service, and was associated with the Service for 63 years.

JACOB G. LIPMAN, PH.D.,* of the Experiment Station, New Brunswick, N. J., died April 19.

CHARLOTTE A. STICKNEY, M.D.,† Pediatrician, Division of Child Hygiene, Minnesota Department of Health, St. Paul, Minn., died February 26.

* Fellow A.P.H.A.

† Member A.P.H.A.

CONFERENCES AND DATES

- American Academy of Tuberculosis Physicians. St. Louis, Mo. May 13-14.
- American Association of Industrial Physicians and Surgeons—24th Annual Meeting. With the American Conference on Occupational Diseases and Industrial Hygiene. Hotel Statler, Cleveland, Ohio. June 5-8.
- American Association on Mental Defect — 63rd Annual Convention. Palmer House, Chicago, Ill. May 3-6.
- American Dietetic Association—22nd Annual Meeting. Hotel Ambassador, Los Angeles, Calif. August 27-31.
- American Heart Association. St. Louis, Mo. May 12-13.
- American Home Economics Association—32nd Annual Meeting, Gunter Hotel, San Antonio, Tex. June 20-23.
- American Library Association. Exposition Auditorium, San Francisco, Calif. June 18-24.
- American Medical Association, 90th Annual Meeting. St. Louis, Mo. May 15-19.
- American Psychiatric Association. Chicago, Ill. May 8-12.
- American Public Health Association. 68th Annual Meeting. Hotel William Penn, Pittsburgh, Pa. October 17-20.
- American Public Welfare Association, Buffalo, N. Y. June 20-22.
- American Radium Society. St. Louis, Mo. May 15-16.
- American Rheumatism Association. St. Louis, Mo. May 15.
- American Society for Clinical Investigation. Atlantic City, N. J. May 1.
- American Society for the Study of Allergy. St. Louis, Mo. May 15-16.
- American Society of Civil Engineers—Summer: San Francisco, Calif., July 26-29. Fall: New York, N. Y., September 4-9.
- American Society of Clinical Pathologists. St. Louis, Mo. May 12-14.
- American Society of Heating and Ventilating Engineers. Semi-Annual Meeting 1939 (Great Lakes Summer Meeting). Grand Hotel, Mackinac Island, Mich. July 4-6.
- American Therapeutic Society. St. Louis, Mo. May 12-13.
- American Water Works Association—59th Annual Meeting. Ambassador Hotel, Chelsea Hotel, Atlantic City, N. J. June 11-15.
- Pacific-Northwest Section. Tacoma, Wash. May 18-20.
- Arizona Public Health Association. Phoenix, Ariz. May 5-6.
- Association for the Study of Internal Secretions. St. Louis, Mo. May 13-14.
- Association of American Physicians. Atlantic City, N. J. May 2-3.
- Association of Dairy, Food and Drug Officials of the United States—43rd Annual Conference. Hartford, Conn. September 26-29.
- Association of Military Surgeons of the United States. Washington, D. C. May 8-10.
- Building Officials Conference of America. Detroit, Mich. May 1-5.
- Central Atlantic States Association of Dairy, Food and Drug Officials. McAlpin Hotel, New York, N. Y. May 18-19.
- Civil Service Assembly—Eastern Regional Conference. Asbury Park, N. J. June 14-17.
- Connecticut Public Health Association. New Haven, Conn. May 23.
- Florida Public Health Association. Jacksonville, Fla. December.
- Food Technology Conference. Under auspices of the Division of Food Technology and Industrial Biology, of the Massachusetts Institute of Technology. Cambridge, Mass. June 28-July 1.

- Health Officers and Public Health Nurses—Annual Conference. Grand Union Hotel, Saratoga Springs, N. Y. June 27–29.
- International Association for Identification. Tulsa, Okla. September 11–14.
- International Cancer Congress—Third. Haddon Hall Hotel, Atlantic City, N. J. September 11–16.
- International College of Surgeons—Biennial Assembly. Hotel Roosevelt, New York, N. Y. May 21–24.
- International Congress of Microbiology—Third. Waldorf-Astoria Hotel, New York, N. Y. September 2–9.
- International Congress of Military Medicine and Pharmacy—Tenth (First meeting of this Congress, organized at the close of the World War, in the Western Hemisphere.) Hotel Willard, Washington, D. C. May 7–15.
- May Day—Child Health Day. May 1.
- Medical Library Association. Hotel Douglas, Newark, N. J. June 27–29.
- Michigan Public Health Association. Lansing, Mich. November 1–3.
- National Conference of Social Work. Buffalo, N. Y. June 18–24.
- National County Officers' Association. Ogden, Utah. July 17–19.
- National Education Association, and affiliated organizations. San Francisco, Calif. July 2–6.
- National Gastroenterological Association. New York, N. Y. June 1–2.
- National Hospital Day. May 12.
- National Institute for Traffic Safety Training (Second). University of Michigan, Ann Arbor, Mich. August 14–26.
- National Tuberculosis Association. Hotel Statler, Boston, Mass. June 26–29.
- New York State Association of Public Health Laboratories. 23rd Annual Meeting. Grasslands Hospital, Valhalla, N. Y. May 8.
- Ohio Federation of Public Health Officials. Columbus, Ohio. May 19.
- Pacific Science Congress—Sixth. Under the auspices of the National Research Council. Oakland, Calif. July 24–August 12.
- Pan-Pacific Surgical Association—Third Congress. Honolulu, T.H. September 15–28.
- Smoke Prevention Association. Milwaukee, Wis. June 13–16.
- South Carolina Public Health Association. Myrtle Beach, S. C. May 29–June 1.
- Southern California Public Health Association. Long Beach, Calif. January 24, 1940.
- Special Libraries Association. Lord Baltimore Hotel, Baltimore, Md. May 23–27.
- State Charities Aid Association's State and Local Committees on Tuberculosis and Public Health. Hotel Roosevelt, New York, N. Y. May 11–12.
- Symposium on Virus and Rickettsial Diseases—short course of lectures, clinics, and demonstrations, with special emphasis on public health significance. Harvard School of Public Health, Boston, Mass. June 12–17.
- Texas Public Health Association. Galveston, Tex. October 2–4.
- West Virginia Public Health Association. Hotel Fairmont, Fairmont, W. Va. November 8–10.
- Western Branch, A.P.H.A. Tenth Annual Meeting. Hotel Oakland, Oakland, Calif. July 23–28.

Canada

- Canadian Public Health Association—28th Annual Meeting. In conjunction with the 25th Annual Conference of the Ontario Health Officers Association. Royal York Hotel, Toronto. June 12–14.
- International Hospital Association. Toronto. September 19–23.
- American College of Hospital Adminis-

trators. Toronto. September 24-25.
American Hospital Association. Toronto.
September 25-29.

FOREIGN

Fourth International Congress of Comparative Pathology. Three Sections: Human Medicine, Veterinary Medicine, and Phytopathology. Rome. May 15-20.

Fifth National Medical Congress of Uruguay. Montevideo, Uruguay. Summer of 1939.

Royal Sanitary Institute of Great Britain. Scarborough, England. July 3-8.

International Federation for Housing and Town Planning. Stockholm, Sweden, July 5-13.

Fifth International Congress on Life-Saving and First-Aid to the Injured. Zurich, and St. Moritz, Switzerland. July 23-28.

World Federation of Education Associations, Eighth Biennial Congress.

Rio de Janeiro, Brazil. August 6-11. (SS. Rotterdam Summer Cruise to South America: from New York, July 5; from New Orleans, July 10; returning to New York August 27.)

International Congress of Public Health and Public Safety. Liege, Belgium. August 12-15.

Third International Neurological Congress. Copenhagen, Denmark. August 21-25.

International Congress on Public Cleansing. Vienna, Austria. August 24-28.

Eighth Pan American Child Congress. San Jose, Costa Rico. August 28-September 4.

International Conference on Sewage Works and Disposal. Glasgow, Scotland. September 12-18.

Intergovernmental Conference of American Countries on Rural Hygiene. Mexico City, Mexico. End of 1939 (postponed from November 10, 1938).

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Results Obtained in an Extensive Tuberculosis Case Finding Program in a Large City*

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THE elimination of tuberculosis is dependent upon the detection, isolation, and proper treatment of every case of tuberculosis before it has reached an advanced stage. To assist in the early detection of cases, the Department of Health of Detroit inaugurated a plan of Tuberculosis Case Finding in December, 1936, involving the medical participation principle.

The essential features of this plan, described in detail elsewhere,¹⁻⁴ were the following:

1. The necessary examinations were to be made by the private physician in his office.
2. The city was to pay for the examination of those who could not afford to pay.
3. Reports of all examinations made under the plan were to be submitted to the Department of Health.

For administrative purposes the city was divided into two parts: one known

as the Special District comprised those sections of the city in which the incidence of tuberculosis was known to be excessively high, as compared with the city as a whole. In this district it was desired that everyone should be examined. With this end in view nurses made a house-to-house canvass to give information about tuberculosis, and to urge everyone to go to his family physician for examination. Physicians were urged to examine their entire clientele living in this district for tuberculosis. The rest of the city comprised the other part. In this district physicians were only supposed to examine known contacts to cases, and individuals whom they might suspect of having tuberculosis. It is thus evident that it was intended that there should be a difference between the two districts as to the number and class of persons to be examined; in one, everyone, and in the other, only contacts or suspects were to be examined.

This study deals with the results ob-

* Read before the Epidemiology Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 27, 1938.

tained during the first 18 months of the operation of the Medical Participation Plan adopted for finding cases of tuberculosis. The figures submitted are based upon preliminary tabulations of reports as they were received from week to week, a condition which did not permit extensive cross-checking for errors and duplications. This method of summarizing the data did not make it possible to be sure that the different groups which one might desire to compare would always include the same persons. Furthermore, it follows from this limitation that the same people may not have been included in the numerators and denominators of the various ratios that would naturally be employed. It is hoped that a complete statistical analysis will be made later by means of punch-cards and mechanical tabulation.

It should be understood that the figures in the tables that follow refer to tuberculin tests and X-ray examinations respectively, and not to individuals. For some individuals duplication of work is included in the figures. In the main, the vonPirquet method of tuberculin testing was used by the private physician, although the Mantoux test was also used to some extent.

GENERAL RESULTS

The general results are presented in Table I. It will be noted that during the 18 month period 114,831 tuberculin tests were reported, and of these, 31,803, or 27.8 per cent, were positive. The results of 27,084 X-ray examinations were reported. These were done by 26 specialists in roentgenology and 38 general practitioners who did their own X-ray work. The doing of these tuberculin tests and X-ray examinations resulted in the discovery of 633 verified cases of active tuberculosis. Approximately 2 per cent of the persons having positive tuberculin tests were found to have active tuberculosis. It may well be emphasized that the 2 per cent only included those cases of tuberculosis of such a degree of activity as to call for treatment.

The percentage of tuberculin tests reported to be positive increased from 24.2 per cent for the first period to 30.5 per cent for the last period. In the absence of any marked change in the age distribution of those tested from period to period this increase probably was due to an improvement in the accuracy with which the tuberculin tests were done by the participating physicians. This might well be expected in view of the

TABLE I

Tuberculosis Case Finding, Detroit

Distribution of Tuberculin Tests and X-ray Examinations According to the Period During Which They Were Done and Result

December 3, 1936, to July 1, 1938

Six Month Period	Tuberculin Tests Reported				X-ray Examinations Reported		Verified Cases Found
	Total	Positive	Negative	Per cent Positive	Per cent of Positive Tuberculin Tests		
					Total		
First	41,434	10,010	31,424	24.2	7,403	74.0	213
Second	33,295	9,565	23,730	28.7	8,757	91.2	204
Third	40,102	12,228	27,874	30.5	10,924	89.3	216
Total	114,831	31,803	83,028	27.8	27,084	85.2	633
Cases per 1,000 Tuberculin Tests						5.51	
Cases per 1,000 Positive Tuberculin Tests						19.90	
Cases per 1,000 X-ray Examinations						23.37	

TABLE II

*Tuberculosis Case Finding, Detroit**Distribution of Tuberculin Tests as Classified by the Reporting Physicians*

April 16, 1937, to July 1, 1938

Class	Tuberculin Tests Reported			Per cent Positive
	Total	Positive	Negative	
Contact	7,299	2,986	4,313	40.9
Suspect	26,858	8,716	18,142	32.5
Unclassified	65,257	17,306	47,951	26.5
Total	99,414	29,008	70,406	29.2

fact that the tests were done by 705 different physicians. With the passage of time the percentage of people having a positive tuberculin test and not going for an X-ray examination, has diminished. For the entire period under consideration approximately 15 per cent of those having a positive tuberculin test did not have an X-ray examination. If we relate the verified cases to the number of X-ray examinations, which approximates the number of persons who had both a positive tuberculin test and an X-ray made, then 2.3 per cent of the positive tuberculin reactors were found to have active tuberculosis.

The doctors were asked to classify those on whom they did tuberculin tests as to whether or not they were con-

tacts, suspects, or in neither of these classes. Table II indicates that the percentage of positive tuberculin reactors, as would be expected, was highest among the contacts. Next follows the suspects, and finally the unclassified group had the lowest percentage of positive reactors. This relationship was found to be true whether one were dealing with the persons living in the Special District, or living outside the Special District.

AGE

Beginning April 16, 1937, the tuberculin tests were classified according to the age of the persons to whom they related. The results are presented in Table III, and it is evident—as would be expected—that the percentage of

TABLE III

*Tuberculosis Case Finding, Detroit**Distribution of Tuberculin Tests and Cases According to Age of Individuals Tested*

April 16, 1937, to July 1, 1938

Age	Tuberculin Tests Reported			Cases	Cases per 1,000 Tuberculin Tests	Cases per 1,000 Positive Tuberculin Tests
	Total	Positive	Per cent Positive			
0-9 Years	20,585	1,216	5.9	25	1.21	20.56
10-19 "	22,441	4,174	18.9	90	4.01	21.56
20-29 "	21,304	8,102	38.0	162	7.60	20.00
30 Years and Over	34,862	15,449	44.3	262	7.52	16.96
Age Not Stated	222	67	30.2	2	9.01	29.85
Total	99,414	29,008	29.2	541	5.44	18.65

TABLE IV
Tuberculosis Case Finding, Detroit
Relationship Between Age and Diagnosis for All New Cases
December 3, 1936, to July 1, 1938

Age	Diagnosis					Total	Adult Types Per cent Minimal
	Childhood Active	Minimal	Moderately Advanced	Far Advanced	Pleurisy with Effusion and Other Forms		
0- 9 Years	29	4	1	0	0	34	80.0
10-19 "	13	29	31	18	8	99	37.2
20-29 "	4	58	77	48	13	200	31.7
30 Years and Over	3	69	121	86	18	297	25.0
Age Not Stated	..	3	...	..	..	3	100.0
Total	49	163	230	152	39	633	29.9

positive tuberculin tests increased with the age of the persons tested. It is also evident that approximately 2 per cent of the positive tuberculin tests, regardless of age, were found to be associated with active tuberculosis in those to whom they related.

For the first 6 months of 1938 a larger number of age groups was employed in making the tabulations. The results corresponded in a general way with those of Table III. At age 50 and over, about 50 per cent of the persons tested were positive.

Table IV presents the relationship between age and the verified diagnosis for all new cases discovered under the Medical Participation program during the 18 months of its operation. It

should be noted particularly that, if only adult types of active tuberculosis be considered, then 29.9 per cent were discovered in the minimal stage; also, that the percentage of minimal cases found decreased with increasing age. Cases were not considered to be in a minimal stage unless they were definitely active and needed treatment. If all minimal cases had been included irrespective of activity, then 53.4 per cent rather than 29.9 per cent were discovered in the minimal stage. It is well understood that the percentage of minimal cases found in different communities depends upon varying interpretations of what a minimal case is, so that the results obtained in different places may not be comparable.

TABLE V
Tuberculosis Case Finding, Detroit
Relation of Tuberculin Tests to Cases Found According to Area of Residence
April 16, 1937, to December 29, 1937

Area of Residence	Tuberculin Tests			Cases	Cases per 1,000 Total Tests	Cases per 1,000 Positive Tests
	Total	Positive	Per cent Positive			
Special District	48,472	13,148	27.1	238	4.91	18.10
Outside Special District	10,840	3,632	33.5	87	8.03	23.95
Total	59,312	16,780	28.3	325	5.48	19.37

RESIDENCE

In accordance with the administrative procedure outlined at the beginning of the paper, it was possible to classify the tuberculin tests and cases according to two areas of residence, namely, the Special District and the rest of the city. The result of this classification is presented in Table V. It will be noted that, of the tuberculin tests done on those residing in the Special District, 27.1 per cent were positive as compared with 33.5 per cent for those living outside the Special District. In view of the fact that everyone was to be tested in the Special District, and that only contacts and suspects were to be tested among those living outside the Special District, the result would seem to be what might have been expected.

It is also evident that, regardless of the area of residence, approximately 2 per cent of the positive tuberculin tests related to people who were found to have active tuberculosis. It is known that a number of those who had a positive tuberculin test did not have an X-ray examination, and therefore this percentage is somewhat too low. If the ratio between cases and tuberculin tests be based on total tuberculin tests rather than on positive tests, then those living inside the Special District had a smaller number of cases per 1,000 tested than was true of persons living outside the Special District. This, however, would be expected because, of those persons

living outside the Special District a larger percentage was positive, and therefore the number of cases found per total number examined would naturally be larger.

For Table VI the distribution of tuberculin tests according to the residence of the persons concerned has been based upon census areas. In a rough way Census Areas A, B, C, K, and L correspond to the Special District in Table V. If Table VI be compared with Table V, it will be noted that the percentage of tuberculin tests that were positive for people living in the Special District, as compared with those living in the rest of the city is approximately the same; also that the cases per 1,000 total tests and cases per 1,000 positive tests, are higher for persons living in the Special District than for those living in the rest of the city. This is the reverse of what was found for the period covered by Table V. These differences call for comment, and the following explanations may be advanced for the evident contradiction.

1. There is a possibility that the efficiency of the tuberculin testing done on persons living in the Special District may have improved more with the passage of time than was the case with the testing done on those not living in the Special District.

2. The restriction placed upon physicians, that only contacts and suspects were to be tuberculin tested, may not have been rigidly adhered to. That this may have been the case is supported by the fact that for the first period covered by Table V, approxi-

TABLE VI

*Tuberculosis Case Finding, Detroit**Relation of Tuberculin Tests to Cases Found According to Area of Residence*

January 1, 1938, to July 1, 1938

<i>Census Areas of Residence</i>	<i>Tuberculin Tests</i>			<i>Cases</i>	<i>Cases per 1,000 Total Tests</i>	<i>Cases per 1,000 Positive Tests</i>
	<i>Total</i>	<i>Positive</i>	<i>Per cent Positive</i>			
A, B, C, K, & L	27,910	8,392	30.1	167	5.98	19.90
All Other Areas	12,192	3,836	31.5	49	4.02	12.77
Total	40,102	12,228	30.5	216	5.39	17.66

mately 82 per cent of the tuberculin tests related to persons residing in the Special District; while for the period covered by Table VI, only 70 per cent of the people having tuberculin tests resided in the Special District.

It does not seem to be epidemiologically sound to compare the results obtained in testing people residing in the Special District with the results obtained for those residing in the rest of the city. The differences obtained are probably due to differences in the way the people were selected for examination, rather than to any difference in the incidence of tuberculous infection as judged by the tuberculin test. The differences observed may be due to such factors as the following:

- 1. That in the Special District everyone was supposed to be examined, while in the rest of the city only contacts and suspects were expected to be examined.
- 2. It is conceivable that the doctors in one district may have had greater efficiency in carrying out and reading the tuberculin tests done.

3. There is a possibility that there was a difference in the age distribution of the people residing in the two districts respectively.

For the first 6 months of 1938 a distribution was made of the tuberculin tests done on children falling in the age group, 0-4 years, inclusive, according to the census area of residence of the children concerned. This, of course, removes the age variable when different sections of the city are compared, but does not eliminate factors 1 and 2 listed above. The results of this distribution are presented in Table VII. It should be noted that the percentage of positive tuberculin tests for children living in Census Areas A, B, C, K, and L, respectively, varied comparatively little. In other words, there seems to be very little evidence that for children there was any difference in the percentage of those exhibiting a positive tuberculin reaction when subdivisions of the Special District were compared. A special

TABLE VII
Tuberculosis Case Finding, Detroit
Distribution of Tuberculin Tests and X-ray Examinations According to Census Area of Residence
Age 0-4 Years

January 1, 1938, to July 1, 1938

Census Area	Number of Tuberculin Tests			Per cent Positive
	Total	Positive	Negative	
A	594	29	565	4.9
B	67	3	64	4.5
C	163	11	152	6.7
D	465	7	458	1.5
E	25	3	22	12.0
F	35	0	35	0.0
G	22	0	22	0.0
H	8	1	7	12.5
I	18	0	18	0.0
J	1	0	1	0.0
K	950	42	908	4.4
L	591	25	566	4.2
M	163	5	158	3.1
N	58	5	53	8.6
O	21	1	20	4.8
P	208	7	201	3.4
Total	3,389	139	3,250	4.1

study of certain subdivisions of the Special District also showed that this result held when persons of all ages were considered. This is what would naturally be expected as Census Areas A, B, C, K, and L are located in the section of Detroit where the environmental and economic conditions are the poorest.

If the percentages of positive tuberculin tests of children, presented in Table VII, for the other census areas be compared, it should be remembered that the differences may depend upon the method of sampling, or size of sample, rather than upon any actual difference between the various census areas in the incidence of infection as judged by the tuberculin test.

If the Special District be compared with the rest of the city, it is found that 4.7 per cent of the children living in the former area, as compared with 2.8 per cent in the latter, were tuberculin positive. This is perhaps tentative evidence that a greater percentage of children living in the poorer section of Detroit are infected with *Mycobacterium tuberculosis* than is the case among those living in the better sections of the city.

SUMMARY

The result of the first 18 months' activities in finding cases of tuberculosis under the Medical Participation Plan may be summarized as follows:

1. 114,831 tuberculin tests were reported by 705 individual physicians. Of these tests, 27.8 per cent were considered to be positive.
2. 27,084 X-ray examinations were reported by 64 physicians.
3. These tests and examinations resulted in

the finding of 633 verified cases of active tuberculosis.

4. Approximately 2 per cent of the positive tuberculin tests related to persons found to have active tuberculosis, and this percentage in a general way was independent of age and residence.

5. Of tuberculin tests stated by the doctors to relate to contacts, 40.9 per cent were positive. Of those relating to suspects, 32.5 per cent were positive, and of those not related to either of these classes, 26.5 per cent were positive.

6. The percentage of positive tests was definitely associated with the age of the persons to whom they related. The percentage of positive tests increased with age, reaching a maximum of 50 per cent at about age 50.

7. Of the cases of adult type of active tuberculosis discovered, 29.9 per cent were in a minimal stage as defined.

8. If adult type of active tuberculosis be considered, the percentage of minimal cases found declined with increasing age.

9. Because of the sampling restrictions imposed, a comparison of the results obtained for persons living in the poor section of the city—that is, the one where a high incidence of tuberculosis existed—with the results obtained for persons living in the rest of the city, was unsatisfactory. The two sections are really not comparable. Some evidence was obtained which indicates that within the poor district there was no marked difference from one subdivision to another in the incidence of tuberculosis as judged by the tuberculin test.

REFERENCES

1. Douglas, Bruce H., and Vaughan, Henry F. A New Administrative Technique in Tuberculosis Case Finding. *Am. Rev. Tuberc.*, XXXVI, 3:325 (Sept.), 1937.
2. Vaughan, Henry F., and Douglas, Bruce H. Intensive Case Finding Work in Tuberculosis. *J.A.M.A.*, 109:771 (Sept. 4), 1937.
3. Vaughan, Henry F., Harmon, G. E., and Molner, J. G. Results of Mass Education for Tuberculosis Prevention in Detroit. *A.J.P.H.*, 27, 11:1116 (Nov.), 1937.
4. Douglas, Bruce H., Vaughan, Henry F., and Harmon, G. E. Experiences with a New Approach to Tuberculosis Case-Finding. *Journal-Lancet*, LVIII, 4:163 (Apr.), 1938.

Production of Mottled Enamel Halted by a Change in Common Water Supply*

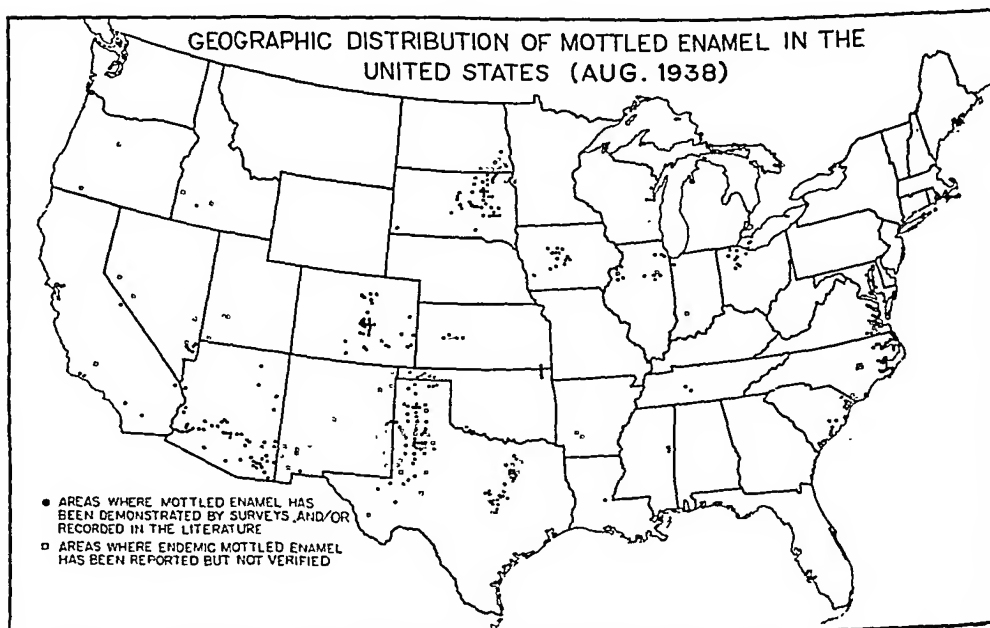
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IN the United States at present there are about 375 known areas, divided among 26 states where mottled enamel of varying degrees of severity is found. This large number of areas made avail-

able for study various communities whose common water supplies contained fluorides in different concentrations. This, in turn, permitted detailed quantitative study of concomitant variations.

FIGURE I



* Read before the Epidemiology Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 25, 1938.

A recent report¹ summarized studies on the quantitative relation between the fluoride concentration of the common

TABLE I

Illustration of Quantitative Relation Between the Fluoride (F) Concentration of the Common Water Supply and Severity of Clinical Affection

City and State	Number of Children Examined	Mean Annual Fluoride (F) Content in p.p.m.	Percentage Incidence of Affection	Percentage Distribution of Clinical Severity							Age Group or School Grade Examined
				Pathognomonic Signs							
				Absent		Present					
				Normal	Quest.	Very Mild	Mild	Moderate	Severe		
Pueblo, Colo.	83	0.6	2.4	88.0	9.6	2.4	...	...	...	9 Year
Jct. City, Kans.	115	0.7	1.7	95.7	2.6	1.7	...	...	...	9-10-11 yrs.
Big Spring, Tex.	68	0.7	3.0	85.3	11.7	3.0	...	...	...	5th, 6th Gr.
Mullins, S. C.	47	0.9	10.6	68.1	21.3	8.5	2.1	...	...	9-10-11 yrs.
East Moline, Ill.	110	1.5*	24.5	55.5	20.0	18.2	5.4	0.9	...	"	
Webster City, Iowa	72	1.6	26.4	65.3	8.3	22.2	4.2	...	...	"
Monmouth, Ill.	38	1.7	42.1	36.8	21.0	36.8	5.3	...	...	9 Year
Galesburg, Ill.	57	1.8	35.1	45.6	19.3	26.3	5.3	3.5	...	"	
Clovis, N. M.	138	2.2	71.0	13.0	16.0	23.9	35.4	11.0	0.7	9-10-11 yrs.	
Colo. Spr., Colo	148	2.5	67.6	18.2	14.2	28.4	21.6	14.2	3.4	9 Year	
Plainview, Tex.	77	2.9	87.0	3.9	9.1	33.7	24.7	24.7	3.9	9-10-11 yrs.	
Amarillo, Tex.	229	3.9†	89.5	3.5	7.0	16.6	24.9	34.5	13.5	"	
Conway, S. C.	59	4.0	88.2	5.1	6.7	20.4	32.2	23.7	11.9	"	
Lubbock, Tex.	168	4.4	97.5	1.2	1.2	10.7	24.4	44.0	18.5	"	
Post, Tex.	38	5.7	100.0	...	...	...	10.5	50.0	39.5	4, 5, 6 Gr.
Ankeny, Iowa	21	8.0‡	100.0	...	...	...	9.5	47.6	42.8	2-12 Gr.

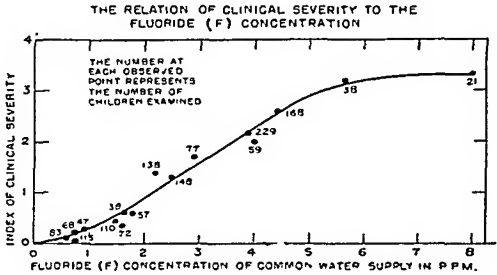
* Subject to possible correction to 1.3 p.p.m.
† Subject to possible correction to 4.2 p.p.m. during susceptible period of the age group examined.
‡ Single determination, all others, arithmetical mean of 12 consecutive monthly samples.

(Computed largely from data recorded in *Public Health Reports*, 52:1249-1264 (Sept. 10), 1937, and *American Journal of Public Health*, June, 1936.)

water supply and the clinical effect. Quantitative increase in the fluoride concentration of the domestic water was concurrent with an increase in the amount and degree of clinical severity. The direct verification of concomitant variation is shown in Table I. In order to present these tabular data graphically, a numerical index of clinical severity was computed by giving a definite weight to each of the several degrees of clinical affection. The following weights were given to each diagnosis: Normal, 0; Questionable, 0.5; Very Mild, 1; Mild, 2; Moderate, 3; and Severe, 4. The weighted index of clinical severity was then plotted against the fluoride concentration of the communal water supply. Figure II shows a rather precise quantitative correlation.

munities where the endemicity of mottled enamel had been confirmed by survey, changed their communal water supply from one containing a fluoride concentration now known to be sufficient to produce endemic mottled enamel to one practically free of fluorides: Each community presented the indispensable conditions of a susceptible population * using the "new" water supply and a sufficient lapse in time (8-10 years) for a study of the consequent

FIGURE II



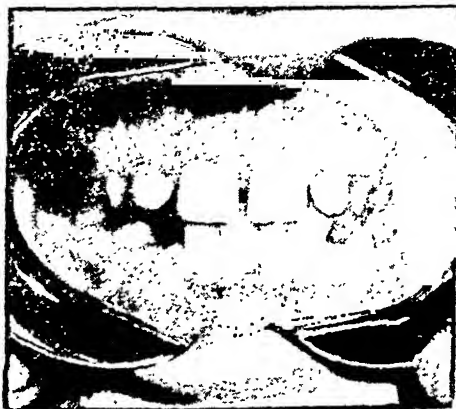
* Children in whom the crowns of their permanent teeth were calcifying.

CONSEQUENCE OF CHANGE IN THE COMMON WATER SUPPLY
A more cogent type of epidemiological evidence is now added to that shown by concomitant variations. Three com-

CHILDREN WHO CALCIFIED THEIR PERMANENT TEETH WHILE USING:



"Old" Bauxite Water
Mottled Enamel: Severe



"New" Bauxite Water
Normal



"Old" Oakley Water
Mottled Enamel: Moderate



"New" Bauxite Water
Normal



"Old" Oakley Water
Mottled Enamel: Mild



"New" Oakley Water
Normal

differences. The two sets of circumstances were similar in all respects save for the one difference, the change in the water supply. The surveys made prior to the change in the water supply and the resurvey made after the requisite lapse of time were made by either one or the other of the writers. The communities studied were: Oakley, Ida., Bauxite, Ark., and Andover, S. D.

Oakley, Ida.—The first instance of a community changing its public water supply solely for the purpose of preventing mottled enamel is that of Oakley, Ida. A survey of this community was made by one of us² in February, 1925. Seventy-eight children whose histories indicated continuous residence and uninterrupted use of the common water supply were examined. The incidence of affection was 100 per cent. The common water supply of Oakley at the time of the survey was obtained from a warm spring. Following the survey, the community on July 1, 1925, changed its water supply, the new supply being obtained from a nearby cold water spring. The selection of this water was based on the observation that the 4 children of a family using this spring were free of mottled enamel.

Approximately 7½ years (February, 1933) after the change in the common water supply, Oakley was resurveyed.³ Twenty-four children born since the change in the water supply were examined. *All showed normal calcification* in those permanent teeth which at that time had erupted. According to analyses³ made by Churchill, the "old" Oakley water contained 6.0 p. p. m. of fluoride; the "new" supply, less than 0.5 p. p. m.

Bauxite, Ark.—In February, 1928, a mottled enamel survey of Bauxite was made by Kempf and McKay.⁴ Sixty of the 62 children of continuous residence examined showed mottled enamel, generally of a severe type. Of the two classified as normal,

Kempf and McKay recorded in a footnote that although the homes of these children were piped for the city water, it appears that it was only used occasionally for domestic purposes. The water used by the 60 affected children examined during the 1928 survey was obtained from deep wells and, according to Churchill,⁵ contained 13.7 p. p. m. of fluoride (F).

In May, 1928, the Bauxite water supply was changed, the "new" supply being obtained from the nearby Saline River. A resurvey⁶ by the writers in March, 1938, showed that of the 45 children born since the change in the water supply, only 2 showed even the mildest form of mottled enamel.* The "new" filtered river water supply is practically free of fluorides, containing less than that determinable routinely (0.2 p.p.m.).

Andover, S. D.—In 1916, one of us (F. S. McK.) made a qualitative survey of the school children of Andover and found mottled enamel endemic, associated with the use of the water from the city artesian well supply.⁷ In 1928 this deep well water supply† failed and the community was forced to change from the 800' artesian to a dug shallow well 22' deep. An examination of the school children by one of the writers (H.T.D.) in April, 1938, showed that

* A possible explanation of the two "very mild" cases is contained in the detailed report of the Bauxite resurvey (*Pub. Health Rep.*, 53:1736-1748 (Sept. 30), 1938). The fluoride (F) content of the "old" Bauxite water was so unusually high, 13.7 p.p.m., that the question of antepartum maternal fluorosis and subsequent transfer of small amounts of fluorides in the mother's milk cannot be excluded. The 7 year old child with the "very mild" diagnosis was nursed 15 months. Consideration might also be given to possible fluoride deposits from the "old" supply in the water pipes and cooking utensils.

† The fluoride content of the "old" Andover (S.D.) deep well water is not known, but presumptive evidence based on clinical mottled enamel among those who calcified their permanent teeth while using this water indicates that it contained fluorides, probably in the neighborhood of 2.5-3.0 p.p.m. of fluorine. Wells of comparable depth in the immediate rural district are likewise producing mottled enamel.

TABLE II

SUMMARY OF THE FINDINGS IN SURVEYS OF THREE COMMUNITIES WHERE THE PRODUCTION OF MOTTLED ENAMEL WAS HALTED BY A CHANGE IN THE COMMON WATER SUPPLY

FINDINGS OF ORIGINAL SURVEY													INCIDENCE OF MOTTLED ENAMEL AMONG USERS OF "OLD" WATER SUPPLY	FLUORIDE (F) CONTENT OF "OLD" WATER SUPPLY	INCIDENCE OF MOTTLED ENAMEL AMONG USERS OF "NEW" WATER SUPPLY	FLUORIDE (F) CONTENT OF "NEW" WATER SUPPLY
AGE OF CHILD AT TIME OF EXAMINATION																
OAKLEY, IDAHO FEB. 1925	WATER USED - CALCIFICATION PERIOD		WARM SPRING SUPPLY													
	NUMBER OF CHILDREN EXAMINED		78													
	% HAVING MOTTLED ENAMEL		100													
BAUXITE ARKANSAS FEB. 1928	WATER USED - CALCIFICATION PERIOD		DEEP WELL WATER													
	NUMBER OF CHILDREN EXAMINED		3 1 3 7 2 2 4 8 10 13 9													
	% HAVING MOTTLED ENAMEL		66 100 100 100 100 100 100 100 100 89													
			96 %													
ANDOVER SO. DAK. OCT 1916	WATER USED - CALCIFICATION PERIOD		DEEP ARTESIAN WELL													
	NUMBER OF CHILDREN EXAMINED		NOT STATED													
	% HAVING MOTTLED ENAMEL		QUALITATIVE SURVEY ONLY. MEDIUM DEGREE OF ENDEMICITY													
FINDINGS OF RESURVEY													%	P.P.M.	%	P.P.M.
AGE OF CHILD AT TIME OF EXAMINATION																
OAKLEY IDAHO FEB. 1933	WATER USED - CALCIFICATION PERIOD		WARM SPR. SUPPLY										92	6.0	0	<0.5
	NUMBER OF CHILDREN EXAMINED		BOTH SUPPLIES COLD SPR.													
	% HAVING MOTTLED ENAMEL		15 10 3 11 15 14 16 8													
BAUXITE ARKANSAS MAR. 1938	WATER USED - CALCIFICATION PERIOD		DEEP WELL BOTH SUPPLIES FILTERED RIVER WATER										100	13.7	4	0.
	NUMBER OF CHILDREN EXAMINED		7 7 10 6 7 5 13 8 14 5													
	% HAVING MOTTLED ENAMEL		100 100 80 50 14 0 8 0 7 0													
ANDOVER SO. DAK. APR. 1938	WATER USED - CALCIFICATION PERIOD		DEEP ART-ESIAN WELL BOTH SUPPLIES SHALLOW DUG WELL										72	+	0	0
	NUMBER OF CHILDREN EXAMINED		6 5 2 2 5 1 6 2 0 6 0													
	% HAVING MOTTLED ENAMEL		83 60 50 50 40 0 0 0 - 0 -													

* IN THE TWO NORMAL CASES AUTHORS RECORD IN FOOT NOTE, DISCONTINUITIES IN USE OF COMMON WATER SUPPLY.

† ON THE BASIS OF CLINICAL EVIDENCE, ARTESIAN WELL SUPPLY PRESUMABLY CONTAINED ABOUT 2.5 TO 3.0 PARTS PER MILLION OF FLUORIDE (F).

the 14 children, 6-10 years of age, born since the change in the water supply, presented normal calcification of the permanent teeth. The "new" water supply used by these children was found to be free of toxic amounts of fluoride.

DISCUSSION

An analysis of the findings, by age groupings, of the resurveys recorded in Table II shows the striking differences resulting from the mere change in the water supply. Those in the higher age groups who calcified their permanent teeth while using the "old" water supply show an incidence of mottled enamel comparable to that observed during the original survey. Next a definite decrease in the percentage incidence of affection becomes manifest in those children whose dental calcifi-

cation period overlapped the change in the water supply (age group who calcified their teeth while using both water supplies), and finally the relative freedom from mottled enamel in those born subsequent to the change in the water supply. These decreasing percentage incidences of clinical affection speak for themselves. With respect to Oakley, they were 92, 20, and 0; Bauxite, 100, 52, and 4; and Andover, 69, 37, and 0, respectively.

While we are fully aware that the number of observations is comparatively small, the effects noted are consistent. The observations, moreover, were limited to those children constantly exposed to the risk of the disease, namely, they were born in the community, had in general always resided there, and had always used the common water supply for both drinking and

cooking. In the case of the resurvey at Bauxite, the facts with respect to residence and water consumption were verified in each instance by an interview with the child's parent.

In specific water-borne diseases, the time intervening between the elimination of the antecedent cause and the nonappearance of the pathological entity is relatively short. The opposite characteristic of endemic dental fluorosis (mottled enamel) makes it unique among the water-borne diseases. An interval in time between 8 to 10 years is required to carry out a human experiment that furnishes clinical proof that the development of the disease has stopped.

With the report on the results obtained at Oakley, Ida., Bauxite, Ark., and Andover, S. D., showing that the production of mottled enamel has actually been stopped by the mere change in the water supply from one containing concentration of fluorides toxic to calcifying dental enamel to one practically free of fluoride (or less than 1.0 p.p.m.), the most conclusive and direct proof that fluoride in the drinking water is the primary cause of human mottled enamel has been presented. The separate steps in the complete chain of evidence may now be summarized as follows:

1. The evidence pointing to mottled enamel being a water borne disease.^{8, 7}

2. The finding of fluorides in domestic waters associated with the production of mottled enamel.^{9, 5, 10}

3. The experimental production of dental lesions in white rats and dogs by waters from endemic areas and waters to which fluoride has been added.^{9, 11, 12}

4. Quantitative epidemiological studies on human mottled enamel correlating the fluoride concentration of the domestic water with the degrees of clinical severity.^{13, 1}

5. And finally, after the lapse of the necessary interval of 8 to 10 years, the clinical evidence that the production of human mottled enamel had been halted by merely changing the common water supply from one containing fluorides in concentrations toxic

to calcifying dental enamel to one practically free of fluorides.^{3, 6}

SUMMARY

1. The production of the endemic hypoplasia of the permanent teeth known as mottled enamel has been halted at Oakley, Ida.; Bauxite, Ark.; and Andover, S. D., by simply changing the common water supply from one containing amounts of fluorides toxic to calcifying dental enamel to one whose fluoride content does not exceed the permissible maximum, 1 p.p.m.

2. Oakley, Ida., and Bauxite, Ark., are the first known instances of communities abandoning an otherwise satisfactory common water supply solely for the definite purpose of preventing mottled enamel; and in itself likewise represents the first instance where a common water supply was changed solely for the purpose of preventing a dental disease.

3. The unusually long interval in time (8-10 years) before the clinical effects resultant from a change in the water supply may be observed clinically, is unique in epidemiological investigations of water-borne diseases.

4. With the report on the results obtained in three endemic areas, showing that the production of mottled enamel has actually been stopped by the mere change in the water supply from one containing concentrations of fluoride toxic to calcifying dental enamel to one practically free of fluoride, the most conclusive and direct proof that fluoride in the domestic water is the primary cause of human mottled enamel, has been presented.

REFERENCES

1. Dean, H. T., and Elvove, E. Further Studies on the Minimal Threshold of Chronic Endemic Dental Fluorosis. *Pub. Health Rep.*, 52:1249-1264 (Sept. 10), 1937.
2. McKay, F. S. Mottled Enamel: A Fundamental Problem in Dentistry. *Dental Cosmos*, 67:847-860 (Sept.), 1925.
3. McKay, F. S. Mottled Enamel: The Preven-

tion of Its Further Production Through a Change of Water Supply at Oakley, Idaho. *J. Am. Dent. A.*, 20:1137-1149 (July), 1933.

4. Kempf, G. A., and McKay, F. S. Mottled Enamel in a Segregated Population. *Pub. Health Rep.*, 45:2923-2940 (Nov. 28), 1930.

5. Churchill, H. V. Occurrence of Fluorides in Some Waters of the United States. *Indust. & Eng. Chem.*, 23:996-998 (Sept.), 1931.

6. Dean, H. T., McKay, F. S., and Elvove, E. A Report of a Mottled Enamel Survey of Bauxite (Ark.) Ten Years After a Change in the Common Water Supply. *Pub. Health Rep.*, 53:1736-1748 (Sept. 30), 1938.

7. McKay, F. S. Progress of the Year in the Investigation of Mottled Enamel with Special Reference to Its Association with Artesian Water. *J. Nat. Dent. A.*, 5:721-750 (July), 1918.

8. McKay, F. S. (in collaboration with Black, G. V.). An Investigation of Mottled Teeth. *Dental Cosmos*, 58:477-484 (May); 627-644 (June); 781-792 (July); 894-904 (Aug.); 1916.

9. Smith, M. C., Lantz, E. M., and Smith, H. V. The Cause of Mottled Enamel, a Defect of Human Teeth. Univ. Ariz., Coll. of Agri., Agri. Exper. Sta., *Tech. Bull. No. 32* (June 10), 1931.

10. Smith, H. V., and Smith, M. C. Mottled Enamel in Arizona and Its Correlation with the Concentration of Fluorides in Water Supplies. *Terh. Bull. No. 43* (July 15), 1932.

11. Sebrell, W. H., Dean, H. T., Elvove, E., and Breaux, R. P. Changes in the Teeth of White Rats Given Water from a Mottled Enamel Area Compared with Those Produced by Water Containing Sodium Fluoride. *Pub. Health Rep.*, 48:437-445 (Apr. 28), 1933.

12. Greenwood, D. A., Hewitt, E. A., and Nelson, V. E. The Effects of Fluorine on Respiration, Blood Pressure, Coagulation, and Blood Calcium and Phosphorus in the Dog. *J. Am. Vet. M. A.*, 86: (N.S. 39) 28-42 (Jan.), 1935.

13. Dean, H. T., and Elvove, E. Some Epidemiological Aspects of Chronic Endemic Dental Fluorosis. *A.J.P.H.*, 26:567-575 (June), 1936.

Public Health Administration

IT is indeed the practitioners of medicine, and chiefly the general practitioners, who by their observations at the bedside have pointed out the way to preserve health and have proclaimed the need for public health administration in season and out of season with a most laudable persistence.

Nay, more, the comprehensive character of public health legislation and administration, as we see it today, came into being through public remonstrances by the medical profession against the disorderly state of the early sanitary laws.—Health and The State, Walter Elliot, *Brit.M.J.* Feb. 25, 1939.

In-Service Training for Doctors and Nurses*

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ALTHOUGH the phrase "in-service training" is one of more recent origin, the principles underlying such efforts have been practised ever since human beings first learned to work together. One must first know exactly what the job is and why it is to be done. Next he must be taught which of the several methods of accomplishing the end is the best. He must then be put under a type of leadership which will allow him to do his job this way and which will foster desirable working relationships and attitudes.

These principles probably sound too simple but in the complexity of planning our programs we often neglect them. We assume that we know our objectives—mouthing the words we have written in our manuals. We use methods to accomplish our ends which we have not critically examined nor experimentally tested for effectiveness. We do not recognize that the attitude toward the job and the working relationships of our staff are often the chief stumbling blocks in the path of efficient service. Perhaps these errors in not thinking through our problems have led to the perfunctory performance which characterizes so much of our school health work.

The principles we have outlined are applicable both to the training of the employee who is just entering service and to the one who needs revitalizing in his job.

What is the job? Assuredly, not to find out how many correctable defects there are per child—not to build up the service so that the total number of nursing home visits shall be increased from year to year—but to serve Johnny Jones, the patient. "To serve the child" is, however, much too vague an objective—for this question, "What is my job?" must be answered in as direct terms as possible. For example, we may say that a part of the school nurse's job is to coöperate with the teacher in the follow-up work. But what in our given school situation is the exact way to do this? What will be the nurse's share in this job? The teacher's? Do they know each other's responsibilities? The answers to these questions must be specific. Does the teacher or the nurse have the better opportunity to procure proper dental care for the children in this school?

Our second principle—knowing how the job can best be done—demands that we know the problems involved. Still considering the rapport between nurse and teacher, let us suppose that we have decided that a regular conference between the two is a method we have selected to promote "follow-up" work. But we must discover what

* Based on a paper presented at the Joint Session of the American School Health Association and the Child Hygiene Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 27, 1938.

problems both the teacher and the nurse face in securing dental aid for Johnny, what information the nurse can give about the clinic facilities available, or what she found out when she visited in the home last week. What does the teacher learn from Johnny as she meets him daily in the classroom? Then, together they may propose a method of handling the problem, test it out, and finally arrive at a solution which will be applicable for all the children in this grade.

Today's solution may, however, not be tomorrow's. We must, particularly for employees long in service, substitute an interest in today's problems for blind adherence to yesterday's solutions. We must test out our procedures repeatedly and be ever on the alert when we inquire into how or why things are done for an inflexible reply, "That is the way we do it." This answer too often implies that the critical attitude is no longer in operation.

The third principle is to afford the employee a type of leadership which will allow him to do his specific job in the best way. I happen to believe in that democratic type of leadership which allows for group participation and group determination of objectives and methods. Some administrators argue that this method is more time consuming. It may be for the immediate present, but in a profession like public health with its complicated problems and its ever changing frontiers, the employee must meet many problems individually, he must adapt what he has to what is needed, and he must be able to follow new procedures from time to time. It, therefore, seems wiser to equip him with a thorough understanding of the philosophy of what we are trying to do, and to allow him to participate in planning the program. He will then feel it is his own and carry it out more efficiently than if he were merely ordered to proceed.

METHODS OF STAFF TRAINING

The Department of Health in New York City has for the past two years carried on an in-service training program in accord with these principles. It has been unusually fortunate in having a group devoting its attention during this time solely to problems of staff education.

Report of these activities is made now only by request, for so short an experimental period makes it impossible to evaluate results. However it does seem possible to offer a critique of the teaching methods which have been used. Inspiration for these remarks is drawn from three sources: the Astoria school health study,¹ a project in staff education for nurses,² and a general training program in the department.

Each training venture has begun with an analysis not only of what the job is but what the training and experience of the staff are. Thus in the school situation, personnel cards were first made out showing where each physician and nurse had received professional education and what experience each had had—not only in medicine and nursing but in teaching, writing, etc. We were then in a better position to judge what subject materials should be emphasized and at what level we could begin.

Ways of inaugurating such training programs and the difficulties which are encountered could be discussed at some length but it seems more pertinent to confine the discussion to the teaching methods which have been used. The training of employees long in service will be stressed, for with the exception of one experiment with an unusually large group of new nurses entering the department, our experience is based on the training of the permanent staff of part-time physicians and full-time nurses in school and child health services.

THE LARGE MEETING AND THE LECTURE

A widely used method of staff training is the large staff meeting at which some one or two pertinent topics are discussed, often in lecture form by an outside expert. Despite its limitations, which are well recognized by all authorities in the field on adult education, this method has been found useful. Our group of 175 school physicians, for example, had little pride in the specific profession of being a *school* doctor. We used vacation times to bring them together for "school health institutes"—21 half-day sessions with speakers on cardiac disease, child psychology, administrative problems, childhood tuberculosis, etc. The programs were determined partially by the suggestions the physicians sent in.

The morale and interest of the group improved markedly following these sessions. We were careful to choose distinguished speakers—but speakers who we knew had something practical to offer our group. No matter how distinguished the speaker, at least 30 minutes were spent to discuss with him in advance of the meeting the problems we faced. Often we found it valuable to stress how this point of view—applicable at another time, perhaps—might not meet today's needs in our department. For example, a very practical pediatrician who was asked to speak on endocrinological problems in school children, said he had long wished for an opportunity to urge school physicians to send children into clinics for early diagnosis of endocrinopathies. We told him our problems in having insufficient staff to get even a child with 20/100 vision to the oculist for the glasses that would enable her to see the blackboard, and our problem with the mother who took fat Johnny to the clinic, only to be told after a long series of elaborate tests, that he should eat less and come back in 9 months for a check-up. Could we get her to go to a clinic again when

sister Mary was found to have a marked hearing loss? No, she had been there last year and nothing happened. Our specialist had never considered these problems.

After this preliminary conversation he came to us with an excellent presentation of the clinical aspects of endocrinological problems, emphasizing the ones which really should be taken to a consultant because therapy might be of benefit and the ones for which little could be done anyway so the child could as well be watched in school.

So the large meeting may be useful—to build morale, and sometimes to "put over" an idea the staff has been slow to accept until it came from someone they considered to be an authority. It should not be assumed, however, that the employee will often be stirred to action by a lecture or that his deeply ingrained habits will thereby be changed.

THE SMALL GROUP AND COMMITTEE

From the point of view of effective teaching the small conference group is usually more influential than the lecture. Here the group can attack problems directly, can organize itself, seek information from a variety of sources, and can work directly in the field. The problems are more practical ones—the solutions often more workable than those concocted in the administrator's office. The use of such employee groups is unlimited—and with wise leadership a source of constant inspiration to the officer responsible for the service as well as an excellent teaching device.

Such conferences are often of more value if all of those concerned in a given service are included. Many problems could not be solved until we had both the physician and nurse around the same conference table. Only then were we able to discover a real answer to the simple question of who should

do what in the school medical room. Another problem may demand that the teacher be at the conference. Ideas expressed at the small conference table can be tried out until we finally discover the best service which doctor, nurse, and teacher can give as a team.

Keeping careful records of these group meetings and circularizing the minutes increases the interest in them. We have even developed a mimeographed journal out of one such group. All of us need recognition and approval—and particularly in a job which tends to become a routine one. Assisting the school physician or nurse to find satisfaction in his or her work is a part of the training program—and the recognition which comes through the journal or report sent to the rest of the staff builds ego as well as being of some intrinsic value.

THE TRAINING CENTER

Another teaching device is the training center. By this we mean a typical unit of service which can be used for teaching the employee while he or she is actually "on the job." No more than the routine staff is assigned to care for the service in this center, and there is no additional equipment. One center now in use for instructing physicians and nurses of our well baby clinics has for example, a "floating" staff of doctor and nurse who are attached to the center to take the place of those who must leave their own work at a baby station to come to the center. The "student" physician and nurse are at present staying one month in the training center. They work here under supervision and guidance. There is plenty of time for discussion and analysis of problems and for frequent staff meetings. The doctor goes on ward rounds in an adjacent medical school pediatric department to refresh his knowledge of the diagnosis and treatment of sick children. Both nurse and

physician visit and participate in special dental and child guidance clinics. Special technics in vision and hearing tests for preschool children may be taught those who will use them. A nutritionist conducts conferences on home relief budgets, costs of infant formulae, etc.

Many teaching devices are used. The doctor may be asked to check all the charts at the end of the clinic and choose which babies should be visited by the nurse. The nurse and doctor together make some of these visits—sometimes on cases which the doctor has written up—sometimes on cases which some other physician has recommended for a home visit. Various problems of special interest are studied. Suppose our doctor is interested in what dosage of cod liver oil seems to be effective in preventing rickets. Why not see what the charts show? It is his research problem, and his disappointment when he cannot find the data he needs in these poorly kept records may be translated into better record keeping.*

The "floating staff" and this student staff meet from time to time to discuss problems—perhaps ones the "floating" staff has found in the field station. Even the supervisors of the student staff are brought in, for everyone must know and understand the program. One pediatrician and one nurse constitute the full-time teaching staff assigned to the center. The educational staff for special topics is borrowed from many sources in the community, for we want our staff not only to learn department routines but to see how we can cooperate with other agencies. After one month the student staff goes back into its own station where an additional teaching physician is assigned to assist

* Improving the quality of the records kept is an important problem in our service. We have, therefore, tried as many devices as possible to stimulate an interest in and an understanding of the need of better records. All these above listed procedures are useful. For another experience of this kind, see reference 3.

with following through the instruction begun in the center and to direct any new ventures.

The training center acts also as an experimental laboratory in which to test new procedures. The experimental attitude stimulates a more critical point of view and through it we are often able to teach some of the points we have long wished to emphasize concerning the service itself.

We have had some experience in which only the physician came to the center—a center in which he did not participate actively in the program and in which the problem approach was not widely used. This was not successful and therefore we have developed this other type of training center.

We have not established a training center for school physicians and nurses. We do not feel that as yet we have reached a point where we are ready for an elaborate training program for this personnel. The school health study unit is analyzing the respective rôles of physician, nurse, and teacher in the complicated school situation in a few schools, but we are not as yet ready to superimpose the procedures used there on the other 600 schools in the city. For, as stated previously, we believe that we must have a fairly clear idea of what the job is before we start a training program.

THE PROBLEM APPROACH

In both the small group and the training center, we have emphasized the problem approach for we believe it to be a most valuable teaching device. It may also be applied to larger groups. We have, for example, about 150 school physicians who are hired on a 12 month basis but work in schools only 10, leaving some time free during the summer. This year we decided that sending school physicians out to visit in homes might emphasize the economic, hereditary, and social factors involved in

nutrition. The group had had a few lectures on the subject. An outline was provided with the questions we hoped they would learn to ask in a case of this kind. Preliminary sessions outlined our objectives and attitudes and presented facts of current food costs, home relief allowances, etc. About 5,000 visits were made in the homes of children whom these doctors had previously diagnosed as "malnourished." They were asked to select from the group visited the children they thought would be benefitted by additional supervision in special health classes. We have not as yet been able to analyze the results of this program but our first reports indicate that the plan had value as a teaching device; and, moreover, it brought us suggestions for our program of health education. Almost twice as many families, in the doctor's opinion, were ignorant of foods and food values as were ignorant of the principles of family budgeting. Our first job, then, would appear to be to give these families a fundamental knowledge of nutrition before we teach them how to spend their available funds to buy these foods. So the problem approach acts not only as a teaching device for the staff but brings to light valuable "hunches" for future plans.

THE EXCHANGE SERVICE

Outside influences may be effectively brought into a staff training program. Does your doctor need additional pediatric training or would closer contact with the clinic to which he refers children benefit your service? Why not arrange for an exchange, in which the hospital resident has some field experience in your department's well baby clinics or schools and your doctor goes back to the hospital service again? Or, perhaps, your school physician would welcome some clinical sessions in your local hospital for contagious diseases? Or as he becomes more aware of the

child's personality, should he attend a child guidance clinic? We have used several of these schemes with some measure of success.

We have also tried on two occasions to send physicians to postgraduate medical schools for training courses but have found it difficult to select from a curriculum designed for the private practitioner courses which meet the needs of our physicians who are not concerned with therapeutics.

OTHER AIDS

There are many other tools which may be of assistance in the in-service training program. The envelope or package library with selected reprints, pamphlets, or small books on a given subject, is valuable, particularly, when the staff has helped select the materials. Building up a reference library for the staff to use is another teaching device and can lead as well to a wider use of the existing library facilities. Circularizing the announcements of open medical and nursing society meetings, adult education forums on pertinent topics, may be just the extra stimulus needed to get the mildly interested to attend.

CONCLUSION

In conclusion we wish to point out that pre-service training is one thing and that in-service training is another. The latter demands that the employee be taught what his job is, how it can best be done, and that he be afforded the type of leadership which allows him to do the job this way. Moreover, the in-service training program is often more concerned with changing attitudes than with teaching specific skills. It is, therefore, necessary to understand the philosophy underlying the service and to study the relationships of the specific job. This is not an easy task—and no one of the several technics which have been described does the trick. After all, the effective training program, as we understand it, is no sleight-of-hand performance, but an ever deepening understanding of what our jobs are, a process of growth which is never completed.

REFERENCES

1. Nyswander, Dorothy B. Practical Procedure in School Health Service. *A.J.P.H.*, 28. 3:334-339 (Feb.), 1938.
2. Kleinschmidt, H. E., and Baumgartner, Leona. Keeping Up with the Job. *The Health Officer*, 2. 7:276-281 (Nov.), 1937.
3. Derryberry, Mayhew. Teaching Nurses to Keep Records. *Pub. Health Nurs.*, 30, 6:361-365 (June), 1938.

Safe Operation of Degreasing Tanks Using Trichlorethylene*

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THE oil and grease films which form on the surfaces of metal objects during their manufacture must be removed before the parts can be successfully plated, enameled, or painted. Several methods of degreasing have been developed including washing in a suitable oil and grease solvent. This method is widely used at the present time, particularly for the degreasing of small metal parts, and the solvent commonly employed is trichlorethylene, a chlorinated hydrocarbon.

The utilization of trichlorethylene in degreasing depends principally on its solvent action on oils and greases. It has the advantage of being non-inflammable and non-explosive.

Trichlorethylene is a heavy, low-boiling, colorless liquid with an ethereal odor. The most important physical and chemical properties are shown in opposite list.

Trichlorethylene vapor is stable on heating † to temperatures up to 257° F. (125° C.) but continued heating above this temperature in the presence of oxygen causes decomposition with cor-

rosive acid formation (HCl). To inhibit such decomposition it is customary for the commercial solvent to contain small quantities of anti-oxidants.¹ Such inhibitors also prevent photochemical decomposition due to light.

Although trichlorethylene is non-inflammable,† at high temperatures such as occur in gas flames, electric heaters, and burning tobacco, its vapors may

PHYSICAL AND CHEMICAL PROPERTIES OF TRICHLORETHYLENE

Formula	C ₂ H Cl ₃
Molecular wt.	131.4
Specific gravity 20°/4° C.	1.4649
Boiling Point (760 mm.)	188.6° F.
Freezing Point	-123.5° F.
Latent heat of vaporiza- tion, B.t.u./16° F. ...	103.1
Specific Heat (liquid) B.t.u./16° F.	0.223
Vapor Density (at B.P. and 760 mm.)	4.53 (referred to air = 1.00)
Solubility in water at 25° C. (gm./100 gm.)	0.17

† Since the preparation of this manuscript, information has been obtained to indicate that trichlorethylene air mixtures are inflammable under certain conditions. Contact of the vapors with sources of ignition such as flames, sparks, and red hot metal should be carefully avoided.

* Read before the Industrial Hygiene Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 26, 1938.

decompose with the formation of corrosive and toxic substances such as hydrochloric acid and phosgene. To prevent inhalation of these, the combustion products from open flames must, therefore, be vented so as to be disseminated safely outside of the building, and smoking in the vicinity of equipment using trichlorethylene must be prohibited.

Trichlorethylene may also be decomposed on prolonged heating in the presence of finely powdered aluminum. This is due to the catalytic effect of aluminum chloride that is first formed. Because of this whenever there is aluminum dust or small chips on the parts to be cleaned, frothing may occur with accompanying bad odors, both indicative of decomposition. The addition of water to the trichlorethylene in the first wash tank as an extreme measure will prevent such decomposition when cleaning aluminum parts.

PHYSIOLOGICAL ACTION

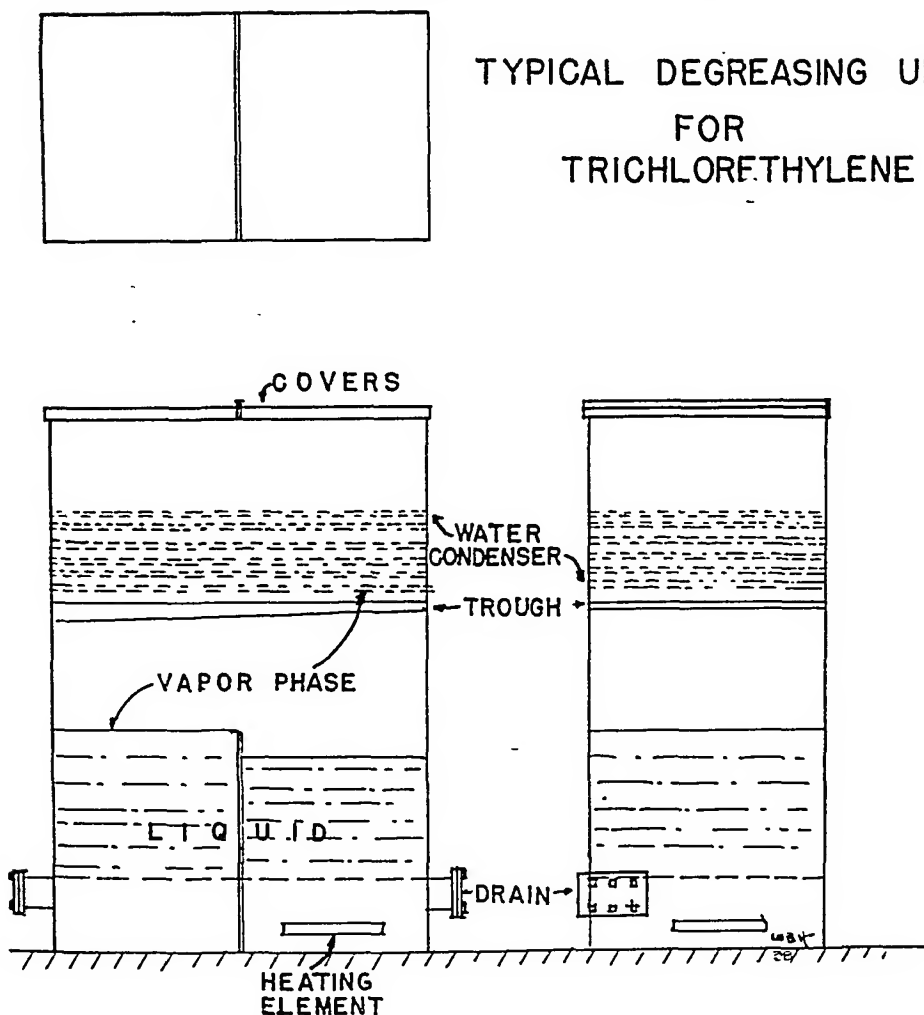
While various authors may disagree on the physiological damage resulting from breathing small concentrations of trichlorethylene it is rather generally agreed that it is toxic and that continued exposure to trichlorethylene vapors constitutes a potential health hazard.

The New York State Department of Labor² studied three individuals who were exposed to trichlorethylene vapors and found symptoms referable to the gastrointestinal and central nervous systems, such as nausea, dizziness, diminished vision, headache, and general ill feeling. Operators of trichlorethylene degreasing tanks frequently complain of headache, dizziness, and nausea.

In the operation of a trichlorethylene degreasing tank, the solvent is heated to the boiling point with the consequent generation of concentrated vapor in the tank over the boiling liquid. The parts

to be cleaned are dipped into the liquid and then suspended in the vapor zone for rinsing before withdrawing from the tank. A condenser built into the tank walls cools the vapor, causing it to condense and return to the liquid supply, thus utilizing the solvent over and over. A well adjusted balance between heat input, cooling capacity, rate of input of metal, and cleanliness of the solvent is required in order to insure the continuous operation of the cycle without escape of excessive quantities of the vapor from the tank. The constant generation of vapor, however, establishes a potential health hazard which becomes real when the operating balance between the liquid and the vapor is not constantly maintained. Because the loss of trichlorethylene vapor from the tank represents an increase in operating cost, the matter of proper operation assumes economic as well as hygienic importance and is thus more likely to be watched. However, degreasing equipment of this type is widely used in small manufacturing plants where quarters may be limited and supervision and maintenance poor, and the potential hazard associated with the use of trichlorethylene in such establishments is therefore greater than that existing in large plants. Hence, it is important to inquire into the requirements for proper design and safe location and operation of degreasing tanks and to determine the need for and design of ventilating systems for such equipment. This report deals with such an inquiry involving the survey of 50 plants in metropolitan New York with the detailed study of 15 of these. The plants were selected at random to give a good sample of conditions and include 26 of one manufacture, 20 of another, and 4 of home-made construction. In size the tanks varied from 140 sq. in. to 15 sq. ft. and were located in rooms varying from 2,000 to 375,000 cu. ft. in volume.

FIGURE I—Diagrammatic sketch of degreasing tank



DESIGN OF TANK

The degreasing equipment in its simplest form consists of a metal tank with heating elements in the bottom for heating the solvent, a water condenser around the upper walls of the tank for cooling and condensing the vapor, with a condensate trough below the condenser into which the condensed solvent drains and from which it flows back into the boiling liquid. The walls of the tank extend well above the condenser to provide adequate free-board above the concentrated vapor level to protect contents against external drafts and the drag out of solvent. For cleaning, a distilling arrangement is provided to permit removing the clean distillate

from the tank, and a suitable sump drain allows for the removal of the sludge and other residue from the bottom of the tank. A cover is provided for closing the tank when not in use. A simple tank is shown diagrammatically in Figure I. There are many variations from this simple design. In one type of tank three separate compartments are provided for washing, rinsing, and drying respectively. Another type allows for immersion in the vapor only. In all these modifications, however, there is no essential departure from the basic cycle of operation outlined above although the efficiency of operation may be improved.

The design of the heating element and the cooling system calls for a careful thermal balance with just enough heat supplied to keep the solvent boiling as the work passes through the tank and sufficient cooling in the condensing zone to maintain a definite maximum vapor level at all times including the period of maximum heat input. The thermal balance is best maintained by thermostatic control of the heating element and also of the dew level. The optimum water temperature at the inlet is about 70° and at the outlet approximately 90° F. The coolest point in the condensing zone should not fall below the dew point temperature of the room to prevent the condensing of water from the air which would increase the diffusibility of the solvent vapor. The maximum vapor level should be maintained at a height above the liquid level of approximately 0.6 times the width of the tank and with a free-board distance from the dew level to the lip of the tank of 15". Among the tanks investigated the free-board height varied from 2" to 20" with a median value of 14".

When gas is used as the heating medium, adequate venting of the combustion chamber to the outside atmosphere must be provided, not only to remove products of combustion, but also to remove hydrochloric acid, phosgene, and other products of heat decomposition of the trichlorethylene vapor. Because of the corrosive nature of these decomposition products it is essential that the vent pipes be constructed wholly of corrosion-resisting materials.

Safety thermostats of the manual re-set type should be installed above the operating vapor level and also immersed in the liquid when the latter is heated by gas or electricity. The function of the first is to shut off the heat when the concentrated trichlorethylene vapor for any reason rises above its normal operating level, while the second

operates to limit the temperature of the heated solvent to prevent too rapid boiling and possibly decomposition. For steam heated tanks a pressure reducing valve is required in the steam line to limit the pressure to 25 lbs. per sq. in.

Facilities for cleaning include a distilling arrangement by means of which the clean distillate is removed from the tank into a separate container, leaving the oil, grease, and other residue in the tank as a sludge, part of which may be removed through a sump drain. The viscous sludge, however, must be removed by scraping, and a suitable side cleanout door is required for this purpose.

Most of the foregoing design requirements have been incorporated in degreasing tanks of standard commercial manufacture and in addition the large tanks are commonly of the enclosed type with automatic feeding of the parts to be cleaned. This type of equipment is more independent of external drafts and also, because of its fixed rate of feed, less subject to fluctuating load than is the manually operated apparatus. The advantages of the enclosed tank and automatic feed are so great that small units are also being so built. Every encouragement should be given to this development.

SIZE OF TANK

Employ a tank large enough to permit the complete immersion of the parts to be cleaned in the liquid solvent and later in the vapor. In one plant over-size parts were being cleaned in a small tank with the part actually projecting above the top of the tank. The hot solvent was applied by means of a long-handle dipper well above the condenser with consequent escape of large quantities of vapor.

OPERATION

The manufacturers of degreasing tanks have prepared comprehensive in-

structions for the safe operation of their equipment. These instructions include information relative to speed of operation, precautions against decomposition of the solvent, technic of cleaning tank, etc., and they should be carefully studied and followed in the plant operation.

SPEED OF OPERATION

The rate at which parts are put through the degreasing tank affects the thermal balance between the boiling solvent and the vapor zone and thus influences the efficiency of cleaning. It also has a direct bearing upon the escape of solvent from the tank. At high speed the parts may come out with liquid solvent still adhering to them and also the rapid movement of the basket and objects into and out of the tank causes a disturbance which results in the escape of vapor-laden air. The importance of controlling the operating speed is clearly shown by the following case report:

Three old tanks were operated at a high production rate in a small room (2,000 cu. ft.) with a great deal of external air movement in the neighborhood of the tanks, with the consequent escape of vapors in considerable amounts. Cleaned parts were also found to have liquid solvent adhering to them after removal from the tank. The concentration of organic vapor at the operator's breathing level was found to be 500 p.p.m.* Following this study the old tanks were replaced by equipment of the latest design; the external drafts were eliminated; and a ventilated table was provided for the temporary holding of the cleaned parts until they were dry and cool. The production rate, however, continued at a high level and a second investigation showed that the average concentration of vapor had been reduced only to 300 p.p.m. in spite of the great improvement in equipment and working conditions.

A rate of feed of parts through the degreasing tank of 8-12' per minute is generally recommended and should be

carefully followed. It is important also to follow the manufacturer's instructions with respect to the holding period in the hot liquid and in the vapor zone. In the liquid bath the parts should be held long enough to be thoroughly washed but should not be allowed to reach the temperature of the boiling solvent. The parts must remain in the vapor zone, however, until they do reach the vapor temperature, at which point condensation ceases and the parts will then be dry as soon as they have been raised above the vapor level. Consideration must be given to the shape of the parts since those with cavities, fine cracks or seams, or parts that rest closely in the basket require a longer washing period, and also there is greater danger of carrying liquid solvent out of the tank.

CONTAMINATION AND DECOMPOSITION OF SOLVENT

The solvent becomes dirty with use. This contamination increases its boiling point and thus changes the thermal balance in the apparatus. If allowed to increase too far there is danger of heat decomposition which results in the liberation of free acid in the bath. Cleaning of parts freshly dipped in an acid bath will also increase the acidity of the solvent. In operation, therefore, the solvent must be maintained in a clean condition by frequent distilling and cleaning of the tank and through proper adjustment, its reaction should be maintained slightly alkaline. The importance of this control in connection with the cleaning of aluminum parts has already been shown.

In use the solvent also becomes contaminated with water which upsets the efficient operation of the equipment and increases the escape of solvent from the tank. The water must be removed at frequent intervals and this is best done by an automatic water separator built into the degreasing tank.

* All vapor concentrations reported in this paper were determined by means of a portable interferometer calibrated for trichlorethylene vapor. The limit of accuracy of this instrument is ± 20 p.p.m.

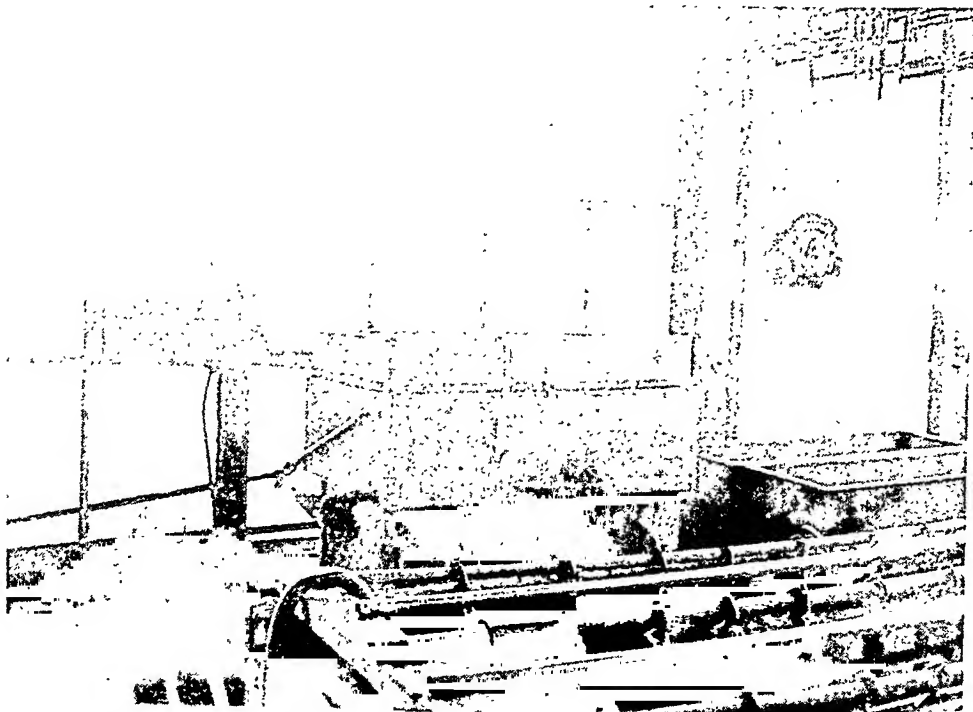


FIGURE II—Tank located by window and fan—high solvent loss

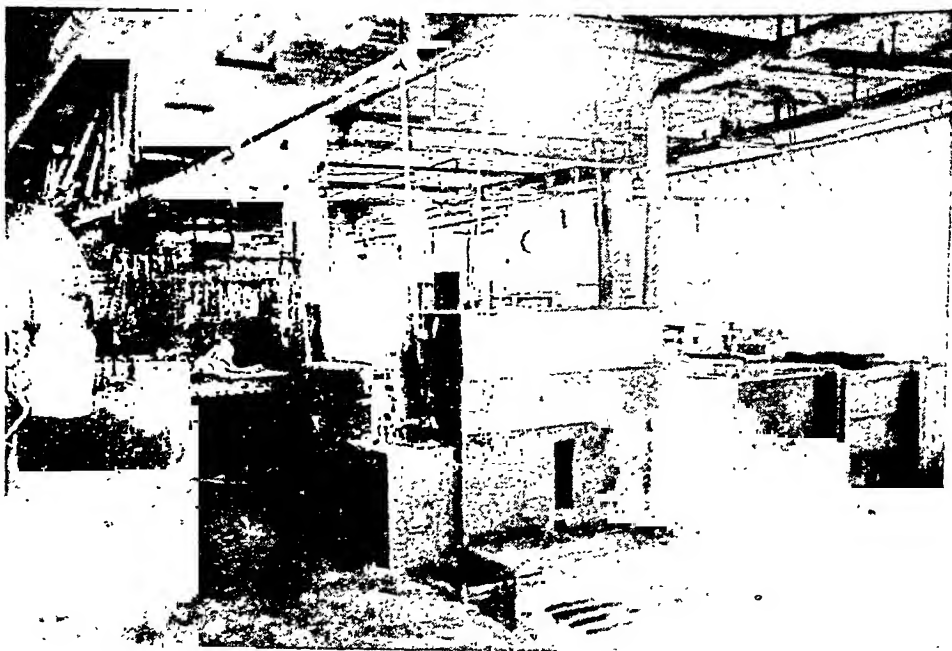


FIGURE III—Tank favorably located in large room

CLEANING

The amount of work done and the quantity of oil and dirt removed determine the frequency with which the solvent and machine should be cleaned. In general, the boiling point of the solvent should not be allowed to exceed 195° F. or the specific gravity to drop below 1.25, and these indices may be used to determine when cleaning is required.

The tank cleaning cycle is as follows: The solvent is boiled and the condensate removed into a separate container by suitable adjustment of the valves in the pipe line leading from the condensate trough. Boiling is continued until all solvent is removed, after which the sump valve is opened to permit the removal of oil and other liquid residue. Metal chips, mud, and other solid residue must be removed by scraping and for this a cleanout door is required on the side of the tank through which the sludge is removed by means of a long-handle scraper of suitable design. Otherwise the operator is forced to bend over the tank and thus expose himself to extremely high concentrations of vapor. It is clear that the solvent, liquid residue, and sludge should be confined as much as possible to minimize the escape of vapor. Cleaning is best done out of regular plant working hours, and the operator should be provided with a suitable respirator for use during the cleaning period. A cartridge type of respirator for absorption of organic vapors is best for this work, with a new cartridge used for each cleaning. The importance of careful control of the cleaning technic is attested to by the frequent complaints on the part of the operators, of dizziness and nausea during cleaning.

COOLING CLEANED PARTS

The cleaned objects come from the degreasing tank at a high temperature and in some plants it is customary to

cool them for immediate use. Exhaust ventilation to the outside rather than positive blowing should be used when an air stream is required for rapid cooling of cleaned objects. This method should also be used for drying parts, when there is danger of dragout of solvent. Thus, in one plant we found a vapor concentration of 420 p.p.m. during the cooling period where positive air was used as compared with a level well below 100 p.p.m. during the actual cleaning operation. In spite of the fact that the tank was located in a very large room (150,000 cu. ft.) the average exposure was high because of this bad practice.

LOSS OF SOLVENT

In a properly designed and operated tank, the solvent loss should be maintained at a low figure, and in practice the actual loss incurred constitutes a good measure of efficient operation and control of the health hazard. Our survey revealed that the solvent loss varied from 0.3 to 15 gal. per sq. ft. of tank area per 100 hrs. of operation with a median value of 3.5. The high losses were associated with careless operation and bad location with respect to drafts. The tank shown in Figure II is well located hygienically but badly from the standpoint of solvent loss.

LOCATION OF TANK

SIZE OF ROOM

For the most part the degreasing tanks were located in large rooms, only 10 being found in rooms less than 10,000 cu. ft. in volume. In the detailed study of the 15 plants the beneficial effect of natural dilution of the vapor was observed in all cases where the room volume was 20,000 cu. ft. or more and no disturbing drafts were present. Thus, in 4 different rooms varying from 20,000 to 150,000 cu. ft. in volume and provided with general ventilation at the rate of 5-12 air changes per hr., the concentration of

TABLE I

Vapor Concentration in Relation to Rate of Ventilation in Small Rooms

Plant No.	Room Vol. Cu. Ft.	Rate of Ventilation Air Changes per Hr.	Vapor Concentration	
			Breathing Zone p.p.m.	General Room Air p.p.m.
6B	2,500	5	500	290
15D	6,000	10	290	230
10B	4,000	23	500	100
13D	2,000	Natural, strong	340	80
18D	8,000		400	20
19D	8,000		60	0

trichlorethylene vapor was zero in the general room air while in the breathing zone of the operator the maximum concentration did not exceed 150 p.p.m. The solvent losses reported for the 4 tanks were 1.0, 3.0, 4.5 and 5.3 gal. per sq. ft. per 100 hrs. operation respectively. The location of one of these tanks is shown in Figure III.

In contrast to the results reported above, the vapor concentration in smaller rooms was found to be high, even in the general air, except when

adequate ventilation was provided. The data presented in Table I indicate that all tanks located in confined spaces should be safeguarded by means of general ventilation at a rate of 30 air changes per hr. It is to be observed, however, that general ventilation alone is not enough to control the exposure directly at the breathing level of the operator, and local exhaust ventilation may be required in addition. When used in conjunction with local exhaust ventilation the rate of general ventila-



FIGURE IV—Tank located in confined room

tion can probably be reduced below 30 air changes per hr.

The location of a degreasing tank in a confined space does not necessarily mean a separate closed room. Location in a pocket off a large room as in Figure IV, or in a pit below floor level, gives the same undesirable results. In one case of a tank placed in a small extension to a room 120,000 cu. ft. in volume, the vapor concentration around the tank averaged 340 p.p.m. with a maximum of 1,080 p.p.m. Pit locations should be particularly avoided because of the high density of the vapor which causes it to collect at low points. All pits containing storage tanks, pumps, or other appurtenances to degreasing equipment should be provided with positive ventilation.

DRAFTS

The tank location must also be selected to avoid disturbing drafts created by open windows and doors, fans, etc., since the action of such drafts is to drag vapor out of the tank and disperse it in the room. In this connection, the location of the tank must be carefully considered in relation to paint spray booths which are commonly operated in conjunction with degreasing equipment. Spray booths require high rates of ventilation, and strong air currents are thus established in the immediate neighborhood. In one plant the opening of the doors was found to create a strong draft by the tank which was corrected by erecting an entrance vestibule. Drafts may be created by the general ventilating system. To prevent this air inlets should be located near the ceiling, remote from the tank, and provided with upward deflectors, while outlets should be placed near the floor since the heavy vapor tends to gather at low points.

A gas heated degreasing tank with natural draft ventilation of the combustion chamber should not be located

in a room in which a mechanical exhaust system is installed unless ample free opening is provided for the intake of make-up air for the exhaust system. Otherwise a negative pressure might develop in the room which would cause a reversal in the direction of air flow through the natural draft vent pipe and thus bring the flue gases into the room. These gases may include not only the toxic products of gas combustion but also phosgene resulting from the pyrolysis of trichlorethylene. The escape of trichlorethylene vapor into a room in which welding and similar high-temperature operations are going on also presents a potential phosgene hazard and must be avoided.

TANK VENTILATION

The present study reveals that a degreasing tank of adequate design and capacity located in a large room free from disturbing drafts and properly operated with respect to thermal balance, cleanliness of solvent, and speed of operation does not create an exposure to trichlorethylene vapor in excess of 150 p.p.m. as the data in Table II show. Ideal conditions are not always found, however, since the results depend to a large extent upon the personal factor in operation. Thus in contrast to the favorable results shown in Table II we have other data indicating unsatisfactory vapor concentrations in spite of good locations, ample room volume, and excellence of tank design. Because there can be little control over the personal factor we believe that the added safeguard obtained through local tank ventilation is necessary for the safe operation of degreasing tanks except under the most favorable conditions. Specifically, it is recommended that local exhaust ventilation be provided whenever the degreasing tank is located in a room less than 20,000 cu. ft. in volume and also on tanks in larger rooms where there is

TABLE II
Vapor Concentrations in Satisfactory Plants.

Plant No.	Room Volume Cu. Ft.	Operation	Sample Location	Concentration p.p.m.
23B	80,000	None	Breathing level of operator	105
23B		Parts imersed	" " "	105
23B		Parts immersed	" " "	21
23B		Parts in and out	" " "	126
23B		" " " "	General room air	0-42
6D	100,000	" " " "	Breathing level of operator	0-105
6D		" " " "	General room air	0
3B	20,000	" " " "	Breathing level of operator	0-63
3B		" " " "	General room air	0

danger of drafts, high-speed operation and poor supervision.

EXHAUST VENTILATING CAPACITY

The exhaust ventilation should be applied laterally at the edges of the tank since the heavy vapor tends to roll over the edge and fall to the floor. A ventilating rate of 60 c.f.m. per ft. of tank perimeter has been found to be adequate. This produces an air movement of approximately 20 f.p.m. toward the exhaust openings at a distance of one foot from the slot. The application of ventilation to the tank disturbs the vapor zone in the tank somewhat and increases the solvent loss. This loss obviously increases with slot velocity. Moreover, it is known that the efficiency of control by lateral ventilation at a given total rate of air flow decreases with an increase in slot velocity.³ Hence, it is desirable to keep this velocity at a low figure. At the same time, the slot velocity must be high enough to make the entrance loss substantially greater than the internal loss in the section of duct into which the slot opens so as to provide for uniform air flow over the tank area and into the

exhaust system. An entrance velocity of 500 f.p.m. appears to be the minimum practical value. Typical exhaust systems are shown in Figure V and Figure VI.

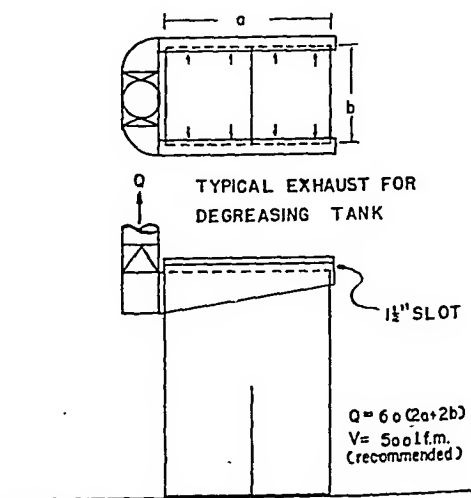


FIGURE V—Local exhaust ventilation applied to degreasing tank (diagrammatic)

RECOMMENDATIONS

As a result of this study of degreasing equipment and the survey of present conditions under which such equipment is installed and operated, we desire to make the following recommendations:

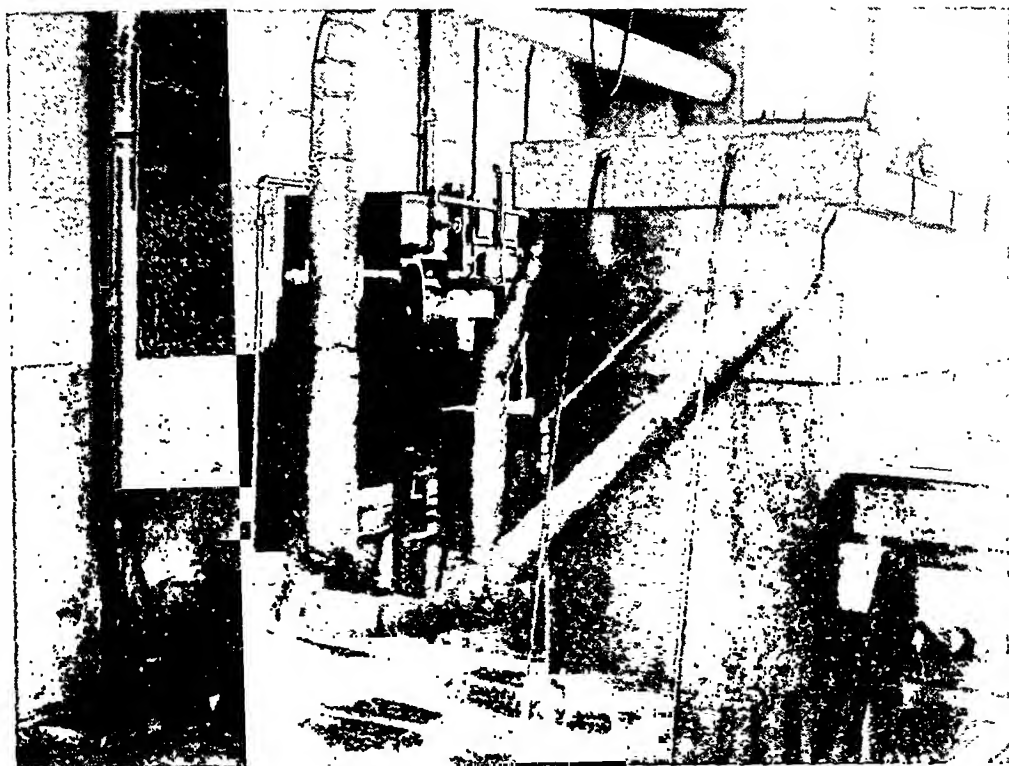


FIGURE VI—Degreasing tank provided with local exhaust ventilation

I. Design of Equipment:

- A. Avoid the use of tanks and appurtenances other than of standard manufacture to insure proper design with respect to required balance between heat input, cooling capacity and thermostatic control.
- B. In every case provide a tank large enough to permit the complete immersion in the solvent of all parts to be handled and wherever possible use an enclosed tank with automatic feed.
- C. Provide a free-board distance from the maximum vapor level to the lip of the tank of not less than 15".
- D. Provide a cleanout door for the removal of sludge.
- E. Provide thermostatic control of the heating and condensing zones and in addition provide safety thermostats to limit the solvent temperature and vapor height.
- F. For gas heated tanks, install a flue from the combustion chamber to the outside of adequate capacity and equipped with a proper diverter. The flue should be of acid-proof construction throughout its length.

II. Location of Equipment:

- A. Wherever possible, locate degreasing tanks in rooms 20,000 cu. ft. or more in volume.
- B. Avoid locations in pits below the floor level or in pockets opening off large rooms.
- C. Do not locate tanks near paint-spray booths or other similarly ventilated equipment.
- D. Eliminate all drafts in the area of the tank.
- E. Gas heated equipment provided with natural draft ventilation must not be located in a room equipped with mechanical exhaust ventilation unless adequate fresh air inlets are provided to prevent the development of a negative room pressure.
- F. Operations involving open flames, electric arc, or other sources of high heat must not be carried on near degreasing tanks.

III. Local Exhaust Ventilation:

- A. All degreasing tanks in confined rooms (less than 20,000 cu. ft.) and other installations not favorably located or properly operated must be provided

with local exhaust ventilation. General ventilation is not recommended in place of local exhaust ventilation but may be required in addition.

- B. Exhaust ventilation should be by lateral movement into slots along the edge of the tank with a ventilating rate of 60 c.f.m. per ft. of tank perimeter. The slot velocity should be approximately 500 f.p.m. and provide for uniform ventilation over the entire tank area.
- C. Provide a ventilated booth or table where necessary for the temporary holding of cleaned parts for drying or for cooling.

IV. Operation:

- A. Operate the degreasing tank in accordance with the manufacturer's instructions.

- B. Pass work through the tank at a rate of 8-12' per min.
- C. Keep the tank closed when not in use.
- D. Clean the solvent and tank at proper intervals and otherwise follow manufacturer's instructions to avoid decomposition and loss of solvent.
- E. Provide solvent vapor absorbing type of respirators to be worn during tank cleaning operations.

REFERENCES

1. Carlisle, P. J., and Levine, A. A. Stability of Chlorohydrocarbons (Trichlorethylene). *Indust. & Eng. Chem.*, 24:1164, 1932.
2. ———. Exposure to Trichlorethylene. *Indust. Bull.* (New York), 16:437, 1937.
3. Yaglou, C. P., Sands, F. W., and Drinker, P. Ventilation of Wire Impregnating Tanks Using Chlorinated Hydrocarbons. *J. Indust. Hyg. & Toxicol.*, 20:401, 1938.

A Precipitative Method for the Titration of Tetanus Toxin and Antitoxin*

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THE obvious advantages of an *in vitro* test for determining the unit-content of tetanus toxin, or of antitoxin, has led a number of workers to try to use the flocculation test of Ramon for this purpose. Scholtz,¹ 1924, using Ramon's procedure, reported that his results indicated that the flocculation test was far less accurate than an *in vivo* test. Abt and Erber,² 1926, titrated a series of 51 samples of antitetanic serum by means of the flocculation test and claimed 90 per cent accuracy for about two-thirds of the samples tested. In only 1 of the 51 samples tested was a double zone of flocculation observed. Kalic,³ 1928, in titrating 53 samples of tetanus serum, found two and occasionally three zones of flocculation; one showing a very rapid nonspecific flocculation over a wide area, and a second (corresponding to the animal tests), in which flocculation occurs much more slowly and in a comparatively narrow zone. Hoen and Tschertkow,⁴ 1929, using a precipitative ring-test for evaluating antitetanic sera, obtained values that

corresponded to the *in vivo* results. Gosh and Ray,⁵ 1937, reported that tetanus antitoxin titrated by flocculation and *in vivo* generally agree to within about 10 per cent. Ramon, Lemetayer and Richon,⁶ 1937, utilizing the flocculative technic show that the unit-content of toxin or toxoid as determined by this method checks reasonably well with the results of the corresponding animal tests. They recommend that the flocculative test be used in preference to the animal test for determining antigenicity.

Gay, in "Agents of Disease and Host Resistance" says that, "Attempts to standardize tetanus antitoxic serum by means of flocculation have not proved satisfactory."

It would appear from a review of the literature that the greatest difficulty in titrating tetanus toxin or antitoxin is the fact that often double or multiple flocculating zones occur, only one of which represents the specific toxin-antitoxic reaction.

This report presents a rapid precipitative method for the titration of tetanus toxin, toxoid, or antitoxin. Essentially, the method consists in mixing a constant volume of toxin with decreasing volumes of antitoxin, incubating for 30 minutes in a water bath,

* Read before the Laboratory Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

and determining the degree of turbidity by means of the photronreflectometer.⁷ The mixture giving the maximal reading corresponds to the neutral point and is the tube in which flocculation first appears if allowed to incubate for several hours at 45° C.

METHODS

In practice 2 cc. of toxin are mixed with decreasing volumes of antitoxin, diluted with 0.85 per cent salt solution so that it contains approximately 600–800 units per cc., the mixture is incubated in a 45° C. water bath for 30 minutes, and then the degree of turbidity is determined by means of the photronreflectometer.⁷ It is shown in Table IV that the mixture showing the maximal turbidity, as indicated by the maximal galvanometric reading, corresponds approximately to the neutral point. Thus, if one utilizes an antitoxin of known unitage, it is possible to calculate the L_t units of an unknown toxin or vice versa. For example, if the mixture of 0.2 cc. of a serum containing 800 units per cc. with 2 cc. of a toxin gives the maximal galvanometric reading, then the L_t units of the toxin equals 800×0.2 or 80 L_t units.

$$\frac{\quad}{2}$$

EXPERIMENTAL DATA

1. *Typical photronreflectometric readings obtained with mixtures of tetanus toxin or toxoid and antitoxin*—Table I shows a typical series of readings obtained with mixtures of toxin and antitoxin after 30 minutes' incubation at 45° C. As indicated, the galvanometric readings increase up to a maximum with decreasing volumes of antitetanic serum and then decrease with a further decrease in the volume of serum in the mixture. Frequently, with larger volumes of serum than those shown in the table, a very rapid nonspecific precipitation occurs, so that in this zone the galvanometric readings will go off the scale in approximately 5 minutes. Because of the rapidity and degree of precipitation occurring in this zone, it is impossible to confuse it with the much slower specific toxin-antitoxic reaction.

2. *Constancy of the combining proportions of toxin and antitoxin*—Table II shows that the mixture of 2.0 cc. of toxin number 641B and 0.4 cc. of antitoxic serum number 6901 gave the maximum galvanometric reading after a 30 minute incubation period at 45° C. If one dilutes the above mentioned toxin 1:2 and mixes it with varying volumes of the same antitoxic serum, it can be

TABLE I

Typical Series of Photronreflectometric Readings Obtained with Mixtures of Tetanus Toxin and Antitoxin After an Incubation of 30 Minutes at 45° C.

cc. Toxin No. 753B	2.0	2.0	2.0	2.0	2.0	2.0	2.0
cc. Serum No. 2522 (dil. 1/4)	0.3	0.27	0.25	0.24	0.23	0.2	0.17
Galvanometric Reading	47.1	48.8	50.5	48.5	48.0	42.2	33.6
cc. Serum No. 2524 (dil. 1/3.5)	0.3	0.27	0.25	0.24	0.23	0.2	0.17
Galvanometric Reading	21.2	23.7	24.6	24.0	23.5	21.0	15.2
cc. Serum No. 2396 (dil. 1/3)	0.28	0.24	0.21	0.20	0.18	0.14	0.10
Galvanometric Reading	34.5	35.5	32.8	30.2	26.2	17.0	15.8
cc. Serum No. 2436 (dil. 1/4)	0.22	0.19	0.16	0.13	0.10	0.07	0.04
Galvanometric Reading	43.5	47.2	48.3	40.4	38.6	26.5	19.0
cc. Serum No. 2458 (dil. 1/5.6)	0.30	0.27	0.25	0.24	0.23	0.20	0.17
Galvanometric Reading	21.0	22.8	24.1	24.5	27.0	23.0	13.0

Maximal Reading Italicized

seen from the table that only half as much antitoxin, or 0.2 cc., is required to give the maximal reading. Similarly, if the antitoxic serum is diluted 1:2 and mixed with undiluted toxin, 0.8 cc., or twice as much antitoxin, is required to give the maximal reading. These data would indicate therefore, that using the mixture giving the maximal galvanometric reading in a series of toxin-antitoxic mixtures one may calculate either units of toxin or units of antitoxin in an unknown sample if standardized antitoxin or toxin respectively is utilized.

and 0.16 cc. of antitoxic serum number 6901 gave the maximal reading regardless of the time interval. It is also shown that this same tube corresponds to the mixture that gives the most rapid and voluminous flocculation if allowed to incubate for a considerably longer time at 45° C. In routine titrations, an arbitrary incubation period of 30 minutes at 45° C. has been adopted because, as is well known, considerable variation in both the flocculation and precipitation time occurs between different samples of toxin or toxoid and various samples of antitoxic serum. In

TABLE II

*Precipitation of Tetanus Toxin and Antitoxin**Effect of Diluting Toxin or Antitoxin on the Mixture Showing Maximal Turbidity*

cc. Toxin No. 641B	2.0	2.0	2.0	2.0	2.0	2.0	2.0
cc. Antitoxin No. 6901	0.55	0.5	0.45	0.4	0.35	0.3	0.25
Galvanometric Reading, 30 min.	37.0	38.0	41.0	46.2	45.0	38.0	29.2
cc. Toxin No. 641B, diluted 1:2	2.0	2.0	2.0	2.0	2.0		
cc. Antitoxin No. 6901	0.4	0.3	0.2	0.1	0.05		
Galvanometric Reading, 30 min.	22.1	24.2	29.0	25.0	22.0		
cc. Toxin No. 641B	2.0	2.0	2.0	2.0	2.0		
cc. Antitoxin No. 6901, diluted 1:2	1.0	0.9	0.8	0.7	0.6		
Galvanometric Reading, 30 min.	31.0	39.0	42.2	41.0	34.0		

Maximal Reading Italicized

3. *Effect of incubation time on the maximal galvanometric reading*—Table III shows a typical series of readings taken after 10, 20, and 40 minutes' incubation at 45° C. As indicated, the mixture of 2.0 cc. of toxin number 758B

no instance, out of several hundred titrations, employing 5 different samples of toxin or toxoid, has it been necessary to incubate for longer than 30 minutes to differentiate the mixture giving the maximal reading.

TABLE III

*Precipitation of Tetanus Toxin and Antitoxin**Effect of Incubation Time on the Maximal Galvanometric Reading
Also Time of First Flocculation**Incubated at 45° C.*

cc. Toxin No. 758B	2.0	2.0	2.0	2.0	2.0
cc. Antitoxin No. 6901	0.18	0.16	0.14	0.12	0.10
Galvanometric Reading, 10 min.	29.2	35.0	30.0	30.5	30.0
Galvanometric Reading, 20 min.	43.2	50.8	40.1	40.9	37.1
Galvanometric Reading, 40 min.	49.5	* 60.0+	60.0	53.0	40.0
Flocculation 125 minutes	—	++++	++	—	—

* Reading off scale

TABLE IV

Titration of Antitoxic Units

2 cc. of Toxin No. 753B—98 L_t Units per cc. or L_t Dose = .0102

Serum Sample Number	Serum Diluted	cc. of Serum to Give Maximal Turbidity	Calculated Antitoxic Units Photronreflectometric Titration	Calculated Antitoxic Units by Animal Test	Ratio Animal-Test-Titer Photo-Test Titer
2505	1/4	0.22	3,560	3,400	0.955
2504a	1/4	0.16	4,900	4,800	0.980
2436	1/4	0.16	4,900	5,000	1.020
2529	1/4	0.17	4,610	4,750	1.030
2530	1/4	0.15	5,230	5,250	1.004
2531	—	0.21	930	1,100	1.183
2504b	1/8	0.32	4,900	4,800	0.980
2349	1/3	0.28	2,100	2,200	1.047
2354	1/6	0.24	4,900	5,000	1.020
2379	1/4	0.26	3,070	3,000	0.978
2396	1/3	0.24	2,450	2,500	1.020
2427	1/5	0.26	3,840	4,100	1.067
2458	1/5.6	0.23	4,770	4,500	0.944
2466	1/3.7	0.26	2,800	3,000	1.071
2516	1/6.2	0.25	4,860	5,000	1.028
2522	1/4	0.25	3,140	3,200	1.019
2524	1/3.5	0.25	2,740	2,800	1.022
		Mean	3,750	3,790	1.022
					±0.052
					PE _m = ±0.00852

4. *Correlation between contents of antitoxic units determined by the precipitative method and those determined by animal tests*—Table IV shows such a comparison. As shown, the mean value of the ratio of the unit-contents determined by animal test to those determined by the precipitative method is 1.022 with a standard deviation of ±0.052. This indicates that a reasonable degree of correlation exists between the two tests and that in general one may expect the two titrations to check within 7 per cent. This agrees with the findings of Abt and Erber in 1926, and Gosh and Ray in 1937, using a flocculative technic.

DISCUSSION

From the data given it appears that the precipitative technic outlined for the titration of tetanus toxin or antitoxin offers a rapid, quantitative method for the estimation of toxic or antitoxic

titers; however, it should be pointed out that only a limited amount of data is available at present and that more samples should be tested before final conclusions are drawn. For example, there appears to be a difference in the combining proportions of refined and concentrated antitoxin with a standardized toxin and unrefined antitoxic serum with the same toxin. Data concerning this problem will be given in a subsequent report.

REFERENCES

1. Scholtz, W. *Centralbl. f. Bakt. I. Orig.*, 92: 434-8, 1924.
2. Abt, G., and Erber, B. *Ann. Inst. Pasteur*, 40:659-665 (Aug.), 1926.
3. Kalic. *Compt. rend. Soc. de biol.*, 98:649, 1928.
4. Hoen, E., and Tschertkow, L. I. *Microbiol. J.*, 8:191-2, 1929 (German Summary).
5. Gosh, B. N., and Ray, N. N. *Indian J. Med. Res.*, 25: 471-6 (Oct.), 1937. *Ibid.*, 24:625-31 (Jan.), 1937.
6. Ramon, G., Lemetayer, E., and Richon, R. *Compt. rend. Soc. de biol.*, 124, 5:416-20, 1937.
7. Libby, R. L. *J. Immunol.*, 34, 71-3, 1938.

Health Problems in Packing Crustacean Products*

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THE nature of crustacean food products is such that they are usually placed at the disposal of the consumer after they have been cooked. They may be canned, in which case they are ordinarily sterilized, but often are sold freshly cooked or cooked and frozen. In those cases where unsterilized, cooked crustacean products are prepared for the consumer's use, care must be taken to eliminate and to prevent the entrance of bacteria which might be detrimental to health. The federal government has long maintained a watchful interest in shellfish and crustacean products in interstate commerce and for the most part the state governments in those areas where food plants of this type are to be found have coöperated with the federal government by the application of sanitary control measures. It is, however, the packer's problem to enforce the proper sanitary measures, since in most cases the state government is not able to supervise the operation at all times. Yet his product

must satisfy the health requirements of the U. S. Food and Drug Administration when it enters interstate commerce.

Research and control experiments, carried out in connection with the preparation of frozen, cooked crustacean products have brought out certain facts which, it is believed, might be of interest to the industry in general.

METHODS OF CONTROLLING CONTAMINATION

Cooking—It is the practice in those states neighboring the Chesapeake Bay to "pressure-cook" crabs. In other states crabs are often cooked by the older method of boiling. Lobsters and shrimps are more often cooked by boiling although there is no reason why pressure cooking is not applicable to these products.

When pressure cooking is properly carried out the packer can be sure that all fecal or related microorganisms have been eliminated. Pressure cooking offers the further advantage of a more uniform product in flavor and texture.

Many plant managers overlook the fact that the pressure cooker offers an excellent means of sterilizing equip-

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ment. Pans, knives, baskets, etc., can be quickly and efficiently sterilized in a pressure cooker at the start of the day's work and at the noon recess, thus helping to prevent contamination of the product with microorganisms.

In the New England States lobsters are generally cooked in a salt water solution for 10 to 15 minutes, the time depending on the size of the lobsters. Although this method of processing lobsters produces an edible and palatable food, experiments carried out on lobsters known to be polluted have indicated that viable fecal organisms are not eliminated from the gills and intestinal tract by this treatment in the short periods used commercially. In fact, with lobsters of medium size it was found necessary to boil as long as 29 minutes to remove all fecal organisms from the intestinal tract. Since lobsters are sometimes stored in polluted waters, the significance of the foregoing from a health standpoint is obvious. On the other hand, the long cooking which toughens the flesh is reduced to a minimum in pressure cooking and a superior as well as more healthful product results.

Chlorine Treatments (external in vitro)—Chlorine solutions are often used in food plants for the purpose of eliminating organisms which, if present in the finished product, might tend to cause decomposition or result in a food material unsuitable from the standpoint of public health. Chlorine, in weak solutions, is sometimes applied to food products themselves but is more often used as a germicide to remove organisms from utensils or other apparatus which might come in contact with the product.

If chlorine solutions are to be applied to crustacean products which are to be frozen, a certain amount of care must be exercised. In high concentrations (above 10 p.p.m.) chlorine may cause chemical changes in foods while they are held frozen in storage, and thus

decrease their storage life to only a few months. These changes result in a deterioration of both color and flavor. This is especially true in the case of crustacean meats.

Chlorine Treatment (internal in vivo)—Dilute chlorine solutions have long been utilized for the purification of shellfish. Two types of treatment are used. In the State of Massachusetts¹ it has been the custom to condition clams in sea water containing a residual of from 0.3 to 0.5 p.p.m. of chlorine. This concentration of chlorine is maintained throughout the treatment. In England² and at the State Shellfish Demonstration Plant at Willoughby, Norfolk, Va.,⁴ a slightly different method is used. Shellfish are given a short preliminary treatment with sea water containing a relatively large proportion of chlorine (up to 5 p.p.m.), after which they are held for longer periods in sea water, previously chlorinated to remove fecal organisms, but containing no chlorine.

It is the claim of those adherents of the type of purification used in England that the oyster or clam is purified and cleaned by its own biological and physiological activity, rather than by chlorine in the water used during treatment. Thus, if the available water is sterile, shellfish will clean themselves, provided other environmental factors are suitable. Since chlorine irritates molluscs, causing them to cease drinking, conditions are said to be more suitable for purification when this substance is absent from the sea water used. Chlorine is used with the English method primarily to eliminate fecal organisms from the treatment water before it is used to condition the molluscs.

With both procedures the time of the conditioning process varies with the degree of purification required, the relative pollution of the shellfish at the start, the temperature of the treatment water, etc.

While clams and oysters are often removed from polluted areas and given purification treatment before they are placed on the market, the authors are not aware that this method is employed commercially for crustaceans. It is nevertheless true that both crabs and lobsters are sometimes floated in water known to contain numerous fecal organisms.

VALUE OF CHLORINE IN SANITARY CONTROL OF CRUSTACEAN PACK- ING OPERATIONS

Chlorine solutions are of considerable assistance in the maintenance of sanitary plant conditions provided they are utilized in an intelligent manner. It is of little use to use chlorine on utensils that are covered with organic matter, since the chlorine is removed from solution by such material. It is, therefore, necessary to clean utensils and apparatus before using chlorine because the mere use of a chlorine solution by itself will not suffice.

It should not be expected that the use of chlorine solutions on crustacean products themselves will solve all sanitary problems. Since such substances are organic in nature they remove chlorine from solution. If, therefore, chlorine is to be used there must not be an accumulation of organic waste material in the wash water, for a stage will finally be reached at which chlorine is removed faster than it can be added. Even though there is no accumulation of waste organic matter chlorine must be constantly supplied to such wash water for the reason that it tends to combine slowly with the product. It is probable that the most suitable method of using chlorine in wash water for crustacean meats is to maintain a constant flow of water containing a definite amount of available chlorine. For all practical purposes, this can be easily arranged by setting up a constant flow of water through a tank containing

a small, valveless outlet, a solution of sodium hypochlorite, or other suitable chlorine source, being allowed to drip slowly from an aspirator bottle into the stream of the incoming water. The amount of chlorine used can be regulated by screw clamp and rubber hose, so that the concentration of this substance in the wash water remains approximately constant for any given flow.

If a food material contains fecal organisms it is hardly possible to remove them by treatment with ordinary chlorine solutions. It has been found that lobster meat containing fecal organisms can be soaked in water containing 10 p.p.m. of chlorine for as long as 2 minutes without destroying all *Escherichia coli* in the product. A concentration of 10 p.p.m. of chlorine was maintained throughout the 2 minute interval; moreover, the lobster meat had been contaminated externally with the bacteria.

Although undesirable organisms are not always removed from shellfish meats by treatment with chlorine it is often quite desirable to use this agent in wash water when packing crustacean products. This is especially true in the case of lobsters where it is necessary to wash tail meat to remove liver particles. The chlorinated wash serves to maintain a low bacterial population in the water, thereby preventing the inoculation of the product with bacteria.

CONTROL OF PACKING OPERATIONS

During the preparation of crustacean products, to be sold as fresh frozen, it is necessary to maintain a constant vigilance with respect to sanitary measures. Whether the product be crabs, shrimps, or lobsters, the proper procedures are much the same. Sanitary type utensils are helpful and often necessary. In this connection utensils, tables, etc., made from stainless steel or an equally non-corrosive material are efficacious since such implements are very easy to clean. Zinc, and galvanized

iron while often utilized to cover tables used in the packing of crustacean products are not desirable for several reasons. An oxide tends to collect on equipment covered with these metals which promotes the accumulation of dirt and makes cleaning and sterilizing difficult. Moreover, these metals wear out quickly leaving holes which are often left unpatched, and hence become traps for waste materials. Even when such worn places are patched the resulting cover is not desirable since dirt-collecting ridges are unavoidable.

The elimination of flies is another problem which must be dealt with by the packer. In one case in which a shrimp product was found to contain *Escherichia coli* it became necessary to peel the shrimps before cooking, cook them in screened trays, cool in the cooking trays, and screen the packing line. Flies were found to be the source of contamination, and since it was impossible to eliminate all flies from the plant itself the above precautions were required.

One of the most important features of packing crustacean products is the training of the workers, a feature which is often overlooked. It is useless to attempt to eliminate the coliform group from a food material if the workers are to handle contaminated articles and then handle the product without properly cleansing their hands. Although state and federal authorities issue statements summarizing sanitary procedures which, if followed, would assure the elimination of fecal organisms, many pertinent points may be easily neglected by a large number of packers unless the utmost control is exercised.

PURIFICATION EXPERIMENTS ON CRUSTACEA (*the blue Crab—Callinectes sapidus*)

The blue crabs taken from the Chesapeake Bay area often come from polluted water localities. In order to elim-

inate fecal organisms, therefore, packing plants in this vicinity usually employ pressure retorts for cooking crabs. A pressure of from 13 to 15 lbs. for 15 to 20 minutes is used. Since the time is taken at the moment that the steam is turned on, the actual pressure-time period cannot be stated. The load in the retort, the efficiency of exhaustion, the temperature of the crabs entering the retort, and other factors determine the temperature-time period of the cook.

The composition of crustacean muscle is such that it is toughened when cooked for long periods. This toughening persists or may even increase after such products are frozen, as storage at temperatures below freezing continues. Provided the cooking of crustacean meats is not too severe, there is little toughening of the product after freezing and during storage.

It seemed, therefore, that a better product might result provided the cooking time was shorter. Moreover, it might be possible to obtain a greater yield by shortening the processing time. Since the long cooking is necessary to destroy organisms which might be detrimental to health it would become necessary to remove them by some other method if the time of cooking were shortened. Conditioning or purification treatment appeared to be the only suitable method by which to remove fecal organisms prior to processing.

THE PURIFICATION STATION

The research concerned with the purification of the blue crab was carried out at the State Shellfish Demonstration Plant at Willoughby, Norfolk, Va. This plant is a two story frame structure 21 ft. by 25 ft. in plan and 18 ft. high.

The treatment tanks, installed on the first floor, were wooden and similar to those designed by Dodgson at Conway, England.² The small treatment tank used was 4 ft. long, 2 ft. wide, and 3 ft. deep, and constructed of cypress lum-

TABLE I

*Milligrams of Dissolved Oxygen Consumed
per Dozen Crabs per Hour*

<i>Temperature of Water</i>	<i>Lot No.</i>	<i>Milligrams of Dissolved Oxygen Used per Dozen Crabs per Hour</i>
25° C.	3	248.80
25.3° C.	4	240.10
27° C.	14	254.13
27° C.	17	262.16
29° C.	15	268.60
29.3° C.	18	271.16

ber 0.15 ft. thick. A baffle was located at each end of the tank and a penstock gate at the inlet end facilitated cleaning of the floor. The floor of the tank contained a false grated bottom and had a slope of 1:50 toward the outlet end.

The water storage tank was also located on the first floor. This tank held 1,400 gallons and contained a mixing baffle at each end. Carborundum air diffusers were located near the outlet end. The sea water, pumped from Hampton Roads through a 2½ in. suction line, first entered a mixing baffle where the chlorine solution, used to remove fecal organisms from the water, was added. The amount of chlorine solution entering the tank could be regulated through a graduated valve on the container in which it was held. The mixing baffle in the outlet end of the storage tank could be used for adding thiosulfate to neutralize chlorine if desired. Aeration of the water was accomplished through the carborundum diffusers in the outlet end of the tank. A pump room, located on the first floor, contained a single unit by means of which water and air were pumped to the storage tank.

EXPERIMENTAL PROCEDURES

The crabs used in purification experiments were obtained from the Chesapeake Bay in areas known to be polluted.

The size of the treatment tank was such that only a small number of crabs

(21 to 81) were used for each test. The storage tank was first filled with sea water, enough chlorine being added to allow a residual of approximately 0.5 p.p.m. immediately after filling operations were completed. The residual chlorine dissipated in a period of ½ hr. while, at the rate that water was allowed to flow through the treatment tank, about 3½ hrs. were usually required to empty the storage tank.

The crabs were given an initial washing with salt water and placed in the treatment tank. At this time 3 crabs were removed for laboratory test. In some cases crabs were placed on racks, in the normal position, but usually were free to swim about in the tank. Water from the storage tank was then allowed to flow into the treatment tank until filled, after which inlet and outlet valves were so regulated that the water level remained approximately constant. With the loss of head in the storage tank the speed of water flow was lessened; it was therefore necessary to regulate the flow at the inlet valve from time to time. The water was aerated periodically, about 6.5 p.p.m. of dissolved oxygen being present at all times. When the storage tank was nearly empty it was again pumped full, chlorine being added as previously. The

TABLE II

*Number of Gallons of Water Required per
Dozen Crabs per Hour to Keep the
Dissolved Oxygen Constant
During Treatment*

<i>Temperature of Water</i>	<i>Lot No.</i>	<i>Gallons of Water Required per Dozen Crabs per Hr. to Keep Dissolved Oxygen Constant</i>
25° C.	3	9.92
25.3° C.	4	9.67
27° C.	14	10.10
27° C.	17	10.52
29° C.	15	10.77
29.3° C.	18	10.87

TABLE III
Bacterial Reduction During the Period of Purification

Lot No.	Treatment Time (hrs.)	Temperature of Water		Amt. of Chlorine in Water During Treatment as p.p.m.	Part Examined	Coliform Organisms Present		Approximate Percentage Reduction
						At Start M.P.N.	After Treatment M.P.N.	
1	24	24	to 25.0° C.	0.01 to 0.1	gills	730	4.6	99
					gizzard	...	...	..
					intestine	1,100	0	100
2	24	24.5	to 25.5° C.	0.01 to 0.4	gills	1,600	62	96
					gizzard	11,000	0	100
					intestine	11,000	0	100
3	24	24.0	to 25.0° C.	0.0 to 0.1	gills	5,400	61	98
					gizzard	11,000	30	99
					intestine	11,000	0	100
4	24	24.75	to 25.25° C.	0.0 to 0.7	gills	6,800	31	99
					gizzard	4,600	4,600	0
					intestine	11,000	110	99
5	24	24.0	to 25.0° C.	0.01 to 1.0	gills	50,000	5.6	99
					gizzard	1,100,000	0	100
					intestine	4,600	0	100
6	24	24.0	to 25.0° C.	0.04 to 0.9	gills	7,800	78	99
					gizzard	4,600	0	100
					intestine	11,000	0	100
7	24	24.25	to 25.0° C.	0.04 to 0.1	gills	5,000	68	98
					gizzard	4,600	15	99
					intestine	11,000	0	100
8	24	24.25	to 25.0° C.	0.1 to 2.0	gills	8,400	0	100
					gizzard	4,600	46	99
					intestine	4,600	0	100
9	24	24.5	to 25.5° C.	0.1 to 1.5	gills	8,400	0	100
					gizzard	27,000	0	100
					intestine	11,000	0	100
10	24	24.25	to 25.0° C.	0.01 to 0.7	gills	7,300	15	99
					gizzard	11,000	0	100
					intestine	1,100	0	100
11	24	24.25	to 25.25° C.	0.07 to 0.45	gills	7,300	31	99
					gizzard	460,000	0	100
					intestine	11,000	11,000	0
12	24	24.25	to 25.25° C.	0.01 to 0.09	gills	15,000	0	100
					gizzard	110,000	0	100
					intestine	11,000	0	100
13	24	25.5	to 26.25° C.	0.1 to 0.25	gills	1,000	170	83
					gizzard	24,000	240	99
					intestine	4,600	120	97
14	24	27.0	to 29.0° C.	0.05 to 0.15	gills	150,000	3	99
					gizzard	240,000	46	99
					intestine	4,600	0	100
15	24	28.0	to 29.0° C.	0.01 to 0.2	gills	78,000	31	99
					gizzard	110,000	46	99
					intestine	4,600	0	100
16	24	29.0	to 30.0° C.	0.0 to 0.03	gills	61,000	250	99
					gizzard	24,000	0	100
					intestine	4,600	0	100

TABLE III (Cont.)

Bacterial Reduction During the Period of Purification

Lot No.	Treatment Time (hrs.)	Temperature of Water	Amt. of Chlorine in Water During Treatment as p.p.m.	Part Examined	Coliform Organisms Present		Approximate Percentage Reduction
					At Start M.P.N.	After Treatment M.P.N.	
17	48	27.0 to 29.5° C.	0.06 to 0.9	gills	640,000	10	99
				gizzard	150,000	0	100
				intestine	11,000	0	100
18	48	28.5 to 30.0° C.	0.01 to 1.5	gills	64,000	0	100
				gizzard	240,000	0	100
				intestine	150,000	0	100
19	48	24.0 to 25.5° C.	0.09 to 0.5	gills	17,000	3	99
				gizzard	24,000	0	100
				intestine	4,600	0	100
20	48	24.0 to 26.0° C.	0.01 to 0.4	gills	150,000	15	99
				gizzard	15,000	0	100
				intestine	46	0	100

TABLE IV

Mortality Rate of Crabs During Treatment

Lot No.	Treatment Time (hrs.)	Temperature of Water	Amt. of Chlorine in Water During Treatment as p.p.m.	No. of Crabs	
				Used	After Treatment
1	24	24 to 25.0° C.	0.01 to 0.10	42	2
2	24	24.5 to 25.5° C.	0.01 to 0.4	30	1
3	24	24.0 to 25.0° C.	0.0 to 0.1	42	12
4	24	24.75 to 25.25° C.	0.0 to 0.7	34	15
5	24	24.0 to 25.0° C.	0.01 to 1.0	37	11
6	24	24.0 to 25.0° C.	0.04 to 0.9	48	1
7	24	24.25 to 25.0° C.	0.04 to 0.1	36	0
8	24	24.25 to 25.0° C.	0.1 to 2.0	53	9
9	24	24.5 to 25.5° C.	0.1 to 1.5	48	3
10	24	24.25 to 25.0° C.	0.01 to 0.7	40	2
11	24	24.25 to 25.25° C.	0.07 to 0.45	55	5
12	24	24.25 to 25.25° C.	0.01 to 0.09	60	9
13	24	25.5 to 26.25° C.	0.1 to 0.25	47	9
14	24	27.0 to 29.0° C.	0.05 to 0.15	40	7
15	24	28.0 to 29.0° C.	0.01 to 0.2	42	16
16	24	29.0 to 30.0° C.	0.0 to 0.3	42	5
17	48	27.0 to 29.5° C.	0.06 to 0.9	42	5
18	48	28.5 to 30.0° C.	0.01 to 1.5	75	12
19	48	24.0 to 25.5° C.	0.09 to 0.5	81	5
20	48	24.0 to 26.0° C.	0.01 to 0.4	79	5
Totals				973	134

treatment tank, therefore, was filled with water throughout the experiment.

After the treatment period had been completed 3 crabs were removed and

examined in the laboratory. In making tests for fecal organisms the gills were removed from the crabs and combined. They were then cut up into small pieces

and 10 gm. were placed in 100 cc. of sterile dilution water. Ten cc., 1 cc. and 1/10 cc. portions of the dilution water (in using untreated crabs higher dilutions were used) were placed in lactose broth and incubated at 37°C. for 48 hrs. Confirmations were made on eosin-methylene blue agar. The same procedure was used for the gizzard-like proventriculus or pharynx and intestines of the crabs, excepting that when intestines were used it was not possible to obtain 10 gm. of the original material. In such cases the results obtained are based on the number of fecal organisms in 100 cc. of dilution water containing intestines of 3 crabs.

During the purification experiments the temperature of the treatment water was taken at hourly intervals. The number of crabs which failed to survive purification treatment was recorded in each case.

In determining the oxygen requirements of crabs (Table I) a number of these Crustacea were placed in the treatment tank and the tank was filled with sea water. Dissolved oxygen determinations were made on the water in the tank at the start of the experiment and at 15 minute intervals thereafter for a period of 1 hr.

EXPERIMENTAL DATA

The water used contained approximately 6.6 p.p.m. of dissolved oxygen per gallon. For purposes of calculation 6.6 p.p.m. can be considered as 24.95 mg. of dissolved oxygen per gallon. The number of gallons of water per hour required to keep the dissolved oxygen of the water constant during the purification treatment can, therefore, be determined.

In Table III the Most Probable Number of coliform organisms³ are given as per 100 cc. of the original dilution water or per 10 gm. of gills or 10 gm. of gizzards. For intestines the figures represent the Most Probable

Number of coliform organisms per 100 cc. of dilution water containing three intestines or per three intestines.

DISCUSSION

It is apparent that crabs require much more oxygen than oysters in order to carry out their physiological processes. According to Messer and Reece⁴ oysters consume an average of 35 to 128 mg. of dissolved oxygen per bushel per hr. at temperatures ranging from 21.3°C. to 23.7°C. At somewhat higher temperatures (25.0°C. to 29.25°C.) crabs have been found to require from 240.10 to 271.16 mg. of dissolved oxygen per dozen per hr. A direct comparison between these two aquatic specimens cannot be made. However, it is evident that one bushel of crabs would consume much more oxygen than the same volume of oysters under identical conditions. This has a significant practical aspect since in practice a volume of sea water two or three times greater would be necessary for the treatment of crabs than that required for the purification of the same volume of oysters.

Unlike the oyster, the crab continues to pump water through its gill chambers even in the presence of 5 p.p.m. of chlorine. This has been demonstrated by placing colored solutions close to the water intake area of crabs (branchial clefts) held just under the surface of water containing 5 p.p.m. of chlorine. The colored solutions could be seen to flow from the water outlet clefts near the mouth.

The mortality rate of crabs during treatment was high, an average of 13.7 per cent. While there is no direct evidence that such is the case it is believed that the condition of the crabs when they arrived at the treatment station and the high temperature of the water during treatment were partly responsible for the high mortality rate. Chlorine, in the concentration used, appears to have no detrimental effect. The fact

that lobsters are floated commercially under similar conditions of pollution would indicate that such methods might be employed for other species of Crustacea.

The results of the purification experiments indicate that only rarely are all fecal organisms removed from the gills, pharynx, and intestines of grossly polluted crabs during treatment. On the other hand, a relatively large reduction of coliform organisms was obtained in almost every instance. It would appear to be more difficult to remove fecal organisms from gills than from the pharynx and intestines of crabs taken from areas known to be polluted. A factor which may be of significance in this respect is the fact that the contents of the pharynx and intestines are usually absorbed or excreted during the treatment period. The gills, on the other hand, often contain considerable sand and detritus even after a purification period of 48 hours duration.

It would be difficult to predict the commercial practicability of crab purification. Provided the temperature and time of cooking could be so decreased as a result of purification treatment to provide a sufficiently superior product and a sufficiently great increase in yield to offset the cost of purification, the process would be justified. It is believed, nevertheless, that in Massachusetts and in Canada where for commercial reasons other than purification it is the practice to float lobsters (*Homarus americanus*) the use of water containing a small residual of chlorine or previously treated with chlorine would have obviously beneficial effects. Lobsters are generally cooked in a weak saline solution. Ordinarily the cooking times and temperatures used are not sufficient to remove fecal organisms from lobsters when these organisms are present. Instead of floating lobsters in sea water containing fecal organisms, as is some-

times done, chlorine in small amounts might be added with little cost. This is especially true in those cases where lobsters are held in tanks containing salt water or sea water.

SUMMARY AND CONCLUSIONS

It is ordinarily not possible to remove all coliform organisms from crabs (*callinectes sapidus*) taken from polluted areas, by holding them in sea water containing no fecal organisms for periods of 24 to 48 hrs. duration. However, a very large percentage of the fecal organisms present in such crabs are removed during treatment.

Due to the fact that crabs require large amounts of oxygen, considerable quantities of sea water must be supplied during the purification treatment of such Crustacea.

A relatively large proportion of crabs died during the purification treatments. This is believed to be due to a combination of the high temperature of the water available and the condition of the crabs when they arrived at the State of Virginia experimental purification station.

A practical aspect would be the use of the purification method to reduce the boiling time for both crabs and lobsters where for any reason pressure cookers are not used.

One must realize, however, that once the crustacean meats are sterilized, unbelievably strict precautions must be exercised to prevent their recontamination.

REFERENCES

1. Wright, Edward. Shellfish Cleansing Plants (Section of a report of the Committee on Shellfish, of the Public Health Engineering Section of the A.P.H.A. Year Book, 1936-1937, pp. 185-186.
2. Dodgson, R. W. Report on Mussel Purification—Reports of the Ministry of Agriculture and Fisheries 10, No. 1 Series II, 1928.
3. Hoskins, J. K. Most Probable Numbers for Evaluation of Coll-aerogenes Tests by Fermentation Tube Method. Pub. Health Rep., 49, 12:393-405, 1934.
4. Messer, Richard, and Reece, George M. Progress in Oyster Conditioning. Pub. Health Rep., 52, pp.1451-1460; also Reprint No. 1870, 1937.

The National Health Program

*How Far? How Fast?**

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BEFORE attempting prophecy in any field it is important to define the character and limits of the area in which one is to do the crystal gazing. What is the national health program about which so much has been said and published within the past year? Even at the risk of repetition it is desirable to summarize briefly its outstanding features so as to avoid argument upon issues and facts not included therein. So much of the controversy about the national health program is concerned with problems only remotely related to it, although these collateral issues may have important social and political significance in other directions.

For purposes of the present discussion the following general assumptions appear non-debatable:

1. The health of the people is a matter of public concern.
2. Ill health is a major cause of suffering, economic loss, and dependency.
3. Good health is essential to the security and progress of the nation.

These assumptions appear to be axiomatic. If controversy rages around any one of the three it can only be because there is difference of opinion regarding the machinery necessary to correct the deficiencies. Certainly at

this date no reasonable opposition may properly be raised to the three fundamental tenets stated above. Upon them rest the basic recommendations in the national health program confirmed in the general agreement reached at the National Health Conference in July, 1938. At that conference no one contested the fact that serious needs for medical service were unsupplied and that society had failed to make full application of available medical science to prevent or control disease and disability.

No one fails, of course, to derive great satisfaction from the increase in the average length of life in our country and from the improvement in the average levels of health and well-being. As the President of the United States has indicated, however, in his message to the Congress of January 23, 1939: "These improvements in the average are cold comfort to the millions of our people whose security in health and survival is still as limited as was that of the nation as a whole fifty years ago."

THE NEED

Statistical evidence of unfulfilled national health needs could be quoted here at length and perhaps even *ad nauseam*, because every published document has emphasized and re-

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emphasized in overwhelmingly convincing statistical data that essential resources for the prevention and care of sickness are lacking in many rural areas and are grossly inadequate in many smaller cities; that hospital services for persons with low incomes are insufficient in many cities; that, at the same time, hospital beds in private and semi-private rooms stand empty because patients are unable to pay the private rates, even in such tremendously wealthy cities as New York City; that in rural areas, general hospital and clinic services are either insufficient or wholly lacking; that government hospitals for tuberculosis and mental diseases are generally overcrowded and inadequately supported.

The statistical evidence would furthermore demonstrate, without reasonable contradiction, that among other specific ailments, tuberculosis, pneumonia, cancer, malaria, mental and nervous disorders, industrial injuries, and occupational diseases are far more prevalent or more deadly than they need to be.

We might go on to prove with more figures that maternity, infancy, and childhood are very inadequately protected, especially in rural areas, and that between one-half and two-thirds of maternal deaths, nearly one-half of stillbirths, and between one-third and one-half of the deaths among new-born infants are preventable. While we are seeking methods for prevention, largely administrative and financial in character, more than 70,000 lives a year are lost in this area of health service delinquency. These lives could be saved.

If your skepticism required further piling of statistical Ossa on Pelion, you should be reminded that on an average day of the year about 5 million persons are disabled by sickness and that about half of them remain permanently disabled. During the course of an average year sickness and disability cost the

American people nearly 2 billion days' absence from work, school, or household duties. Those in the labor market lose annually by this sickness and disability over a billion dollars in unearned wages.

It may be reasonably concluded that the need for a national health program is clear. The history of health service in the United States shows with equal clarity that no rigid lines can be drawn between the services required for the prevention of disease and those essential for the care of the sick. In defining the objective of a national health program, therefore, one must assume that all areas in the country and all members of the population shall have the protection of adequate public health services and an opportunity to avail themselves, in accordance with their medical needs, of adequate care in sickness.

THE NATIONAL HEALTH PROGRAM

Paraphrasing the findings of the report on national health by the Interdepartmental Committee, one might say that in the United States we have patients without doctors, hospitals, and public health service; and doctors, hospitals, and public health service without patients. What is the program for correction? In its simplest terms it rests primarily upon the recommendations of the Interdepartmental Committee, discussed and confirmed at the National Health Conference held in Washington, D. C., July 18-20, 1938. These specific recommendations may be restated briefly as follows:

a. The expansion and strengthening of existing federal-state coöperative health programs under the Social Security Act, through more nearly adequate grants-in-aid to the states, and, through the states, to the localities.

If this recommendation were put into effect, it would require, at its peak, additional annual expenditures by fed-

eral, state, and local governments, of \$365,000,000, or somewhat less than one cent per capita per day.

b. Grants-in-aid to the states for the construction, enlargement, and modernization of hospitals and related facilities where these are nonexistent or inadequate but are needed, including the construction of health and diagnostic centers in areas, especially rural or sparsely populated, inaccessible to hospitals. Grants toward operating costs during the first years of such newly developed institutions to assist the states and localities in taking over responsibilities.

Averaged over a 10 year period, the total annual cost of such a program, including special 3 year grants for maintenance of new institutions, is estimated at \$147,400,000, or approximately 0.3 cent per capita per day.

c. Grants-in-aid to the states by the federal government to assist them in developing programs of medical care.

It is estimated that this part of the program could begin with the expenditure of \$50,000,000 the first year with gradual expansion until the expenditure reaches the estimated level of \$400,000,000 annually which would be needed to provide minimum care to the medically needy groups. At the peak this would involve approximately somewhat less than one cent per capita per day.

The maximum annual cost to federal, state, and local governments to implement financially recommendations (a), (b), and (c) is estimated at about \$850,000,000 at the full level of operation within a 10 year period. In the 10th year, therefore, the average per capita per day cost for the people of the United States for the National Health Program would be less than 2 cents.

An additional recommendation made by the Interdepartmental Committee transcends perhaps in ultimate im-

portance the three already noted. The committee, in making the recommendation, directs attention to the economic burden created by sickness for self-supporting persons. The committee emphasizes particularly that the costs of sickness are burdensome more because they fall unexpectedly and unevenly than because they are large in the aggregate for the nation or, on the average, for the individual family. The burdens of sickness costs can be greatly reduced through appropriate devices to distribute these costs among groups of people and over periods of time. In this particular field everyone is aware that the approach to the objective must be made slowly. Planning for a program of medical care sufficiently widespread to serve 130 million people would obviously require some years of development. It is probable that both public funds and private insurance contributions will ultimately find major places in the basic development of this particular undertaking. Here, too, the committee is in agreement with most observers that the rôle of the federal government should be principally that of giving financial and technical aid to the states in their own development of sound programs through machinery and financial plans largely of their own choice.

HOW FAR—HOW FAST?

The rate of implementing such a program as briefly outlined above rests, as Thomas Parran has recently pointed out, largely upon our future social concepts of which public health action is an integral part. Haggard has similarly suggested that "The physician fails to see that medicine itself is one of the institutions affected by the changes that are brought about (by medical science). Medicine does not stand alone; it is an integral part of society. . . . Public opinion determines the condition and future of medicine. . . .

"The permanent basis of medicine is not its research, but its social application—its practice."

The speed with which the national health program is converted into action is contingent therefore upon how rapidly its objectives become clear to and are accepted by the lay and professional members of society. For the moment all of us are so concerned with the machinery of implementation that we have lost sight of the tremendous social sweep involved in the proposals. How far and how fast the program should move rests almost entirely with the desires of the people. Many misguided individuals have the belief that the program will rise or fall upon the support of opposition of this or that group of official or voluntary professionals. This is highly unlikely, because, in this as in every other important step forward in social progress, the public has dragged the professional groups with it in its march toward attaining the wider benefits of medical and public health service. The history of public health development in this country and in England discloses many confirmatory evidences of the fact that major steps forward in public assumption of responsibility for the prevention and cure of disease have generally resulted because of the demands of the people, in spite of the lethargy and meticulous attention to detail of the professional worker.

The question which now confronts your own and every other interested group in this country is whether or not we shall repeat the errors of lack of courage, of procrastination, and of resistance to sound and logical public demand which have marked the steps forward in every other country as well as in our own.

No one can escape the fact that the development of such a program as outlined is beset with dozens of administrative, financial, and psychological

problems. These may be attacked and solved with timidity or with courage. Upon the nature of this attack will depend the answers as to how far and how fast the country may proceed.

The satisfactory development of the program will require the expenditure of large amounts of money, but it is money which is now spent in too great part inadequately, wastefully, and unintelligently. An essential of this program as in any other preventive program is the provision of adequate funds for research into the cause and cure of disease. To maintain the quality, scope, and amount of medical service essential for the successful operation of the program will place great strains upon the facilities for the education of physicians and other professional persons. Professional workers in the public health field will be needed in increasing numbers. Time must be permitted for their training and for their absorption into the administrative activities which will confront us in the future.

Notwithstanding these pressing and difficult problems, the need for correction should control the decision as to the speed of adoption of answers. We have always found a way to provide the machinery for improving the general level of health of our people as the necessities were demonstrated and as the scientific facts warranted. A prime requisite, however, for a successful search is a universal recognition of need. This universal recognition is still delayed.

A RISK AT PROPHECY

In reviewing these problems, one is always tempted to indulge in the dangerous art of prophecy, even while remembering Lowell's dictum in *The Biglow Papers*: "Don't never prophesy—onless ye know." The speaker hazards the following comments, however, assuming a high de-

gree of indulgence on the part of the audience.

1. Within 10 years the major elements of the national health program will be in effect, because the people want it, can pay for it, and are entitled to it.

2. The public health officer will play a major rôle in the evolution of the program, not always because he wants it, but because the forces of logic normally place the responsibility upon him.

3. Medical care will be universalized for the medically needy and for the lower income groups. It is probable that this universalization will proceed through the channels of tax-supported subsidies and voluntary insurance programs and ultimately toward a compulsory insurance scheme. This approach through experimental operations

to compulsory health insurance will probably consume several decades, because in this as in all other efforts toward social amelioration, we must experience the same mistakes made elsewhere, before we learn to avoid them. These mistakes, contrary to the views of many, have considerable constructive value since they result in processes adjusted to the peculiarities of our own people and institutions.

4. In the fields of medical care and public health, equalization or levelling of necessary service independent of geography or economic status will occur as it has in universal education, postal service, transportation, public welfare, and other basic necessities for a safe and healthy society of people. Resistance to universalizing these services is doomed to fail as long as we preserve a true faith in democratic institutions.

Preliminary Observations on the Epidemiology of Mental Disease*

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THE application of the epidemiologic method to the study of diseases other than those caused by infectious agents has often been suggested. Some attempts have, in fact, been made to put these suggestions into practice but most of these attempts have been based on broad statistical studies rather than detailed investigations in the field. They have not been markedly fruitful.

The social and economic implications of the problem of mental disease are so tremendous and the limitations of study by the usual clinical methods are so strict, that an attempt to study the prevalence of mental disease in the field by the epidemiologic method seemed justifiable.

The Eastern Health District of Baltimore offers a favorable field for such a study. Its population of some 57,000 has been carefully studied over some 7 years, and unusually complete and detailed information as to its composition and characteristics is available. The presence within the district of a large psychiatric clinic with its active outpatient department, makes available a psychiatric service of the highest order, and the well organized health activities of the district maintain con-

tinuous and intimate contact with the population.

The study of mental disease in the district, made possible by a grant from the International Health Division of the Rockefeller Foundation, has been in progress for some 4 years. The fundamental purpose of the work is to study the prevalence of mental deviation in the field, by the methods usually spoken of as epidemiologic; that is, by a study of the cases with a view to isolating such differences as they may exhibit when compared with the population as a whole.

The difficulties have, of course, been considerable. No precedents are to be found in the literature for such a study, and technics have had to be worked out as the study progressed. Since the work covered both the work of psychiatry on the one hand, and of epidemiologic statistics on the other, personnel capable of working in the two fields had to be developed.

The object of the study, mental deviation in its broad sense, is by no means well defined either clinically or otherwise, and no reliable statistics are at present to be found other than those based on admissions to mental hospitals or to mental hygiene clinics. The first step was, naturally, to attempt to determine the true rates of prevalence of mental deviation, as a whole

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and by types, for the year 1933. This involved the collection of all available information regarding every discoverable case of frank psychosis which had been committed to a mental hospital or treated in a clinic, or otherwise come to attention, and regarding all persons who had in any manner exhibited recognizable evidence of mental deviation.

While this initial census cannot be regarded as complete, it brought together the names of, roughly, 3,900 persons who could be regarded as coming within the general scope of the study. This is 7 per cent of the total population of the district. In this gross total of 3,900 cases, were included about 1,300 adult delinquents of whom nothing is known other than the fact that they were arrested by the police for a wide variety of offences. Eliminating these from the total, there remained about 2,500 people, or $4\frac{1}{2}$ per cent of the population, who seem proper objects of study.

The collection, tabulation, and analysis of the material regarding these 2,500 people have proved difficult and time consuming procedures. The cases have been classified by the psychiatric member of the staff according to broad "reaction types." Of these broad classifications, analysis of the cases of psychosis and of personality deviations is sufficiently advanced to give some idea, at least quantitatively, of the problem.

In the class of the psychotics are found 335 persons, a rate of 818 per 100,000 of the population 15 years of age and over. The white rate (875) is considerably in excess of that for Negroes (599). These figures represent the total number of residents of the district who were in 1933 to be classified as "psychotic."

First admissions correspond roughly with the incidence rates in other diseases. For 1933, this included 71 cases, or a rate of 175 per 100,000

population per annum. In first admissions the Negro rate is considerably higher than that of the white, 252 against 155, and the rate for males of both races is markedly higher (214) than that for females (139).

One striking fact is the marked difference in the incidence of psychosis between the two wards of the district. The two wards do not differ greatly in character or in the general composition of the population. Considering total prevalence, Ward 6, which occupies the southern half of the district, has a rate of 969 per 100,000 as against 679 for Ward 7. This difference holds for both whites and Negroes. The number of first admissions is so small for a single year that reliable detailed incidence rates cannot be calculated until the experience of a number of years is available.

The larger group of cases classified as general personality disorder, permits of more detailed analysis than does the relatively small group of psychotics. Such an analysis of this material, including 1,310 cases, has revealed many interesting and perhaps significant facts. Here again the southern ward (6) exhibits a far higher rate of prevalence than does the northern ward (7). The eastern sections of both wards show far higher rates than do the western. While a large part of this difference is due to the distribution of the Negro population, which is for the most part concentrated in the western end of the district, this factor does not explain all of the difference. In general, the rate of prevalence for the white population tends definitely to vary directly with the proportion of the Negro population living in the same area.

An interesting factor in the situation is presented by the Jewish population, which constitutes, roughly, slightly more than 9 per cent of the white population of the area. The Jews of the Eastern Health District present far

PERSONALITY DISORDER

*Rates of Prevalence per 1,000 of Population for the Eastern Health District,
By Color, Race, and Geographic Division*

Race	Rates per 1,000 Population					
	Ward Six			Ward Seven		
	East	West	Total	East	West	Total
Whites:						
Jews	35.74	64.07	47.96	19.23	53.36	40.52
Non-Jews	16.16	27.37	17.68	10.40	13.16	10.77
Total White	18.90	43.52	23.64	10.52	18.63	11.76
Negroes	.....	28.27	.....	.....	21.69	.....
Total		36.46			20.82	

higher rates of personality deviation than do the remainder of the white population, and a large part of the difference in prevalence in the white population as between the two wards is due to concentration of Jews in Ward 6. This does not, however, account for all the differences, since the rate of prevalence in non-jews in Ward 6 is significantly higher than in Ward 7. The rate of prevalence of Jews in both wards is from three to four times as high as that of non-Jews. Similarly significant differences in rates of prevalence are exhibited when the two wards are divided into eastern and western sections. Both for Jews and non-Jews, the rates in the western sections are higher than those of the eastern.

Analysis has been made by size of household, showing significant increase in prevalence in both wards with increase in the size of the household. Analysis by economic status shows extraordinary differences. In Ward 6, homes of the lowest economic status

have rates almost 6 times as high as do homes of the best classes, and the difference in Ward 7 is almost as great.

Even such simple analyses of the basic data as have been outlined, those of color, sex, race, geographic distribution and economic status, reveal important and sometimes striking differences in the prevalence within the district of certain forms of mental deviation. Of the significance of these differences, it is as yet too early even to speculate. The work already done indicates only that at the time of the first census these differences did exist. Subsequent work will show whether or not they are constant, and may make their interpretation possible.

Along with the analysis of the material collected for the year 1933, current information has been accumulated, and for the year 1936 a second census has been made. The analysis of this material should, when completed, answer some of the questions raised by the material here presented.

Integration of Health Department Records*

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DURING the first 6 years of its existence the Westchester County Department of Health accumulated more than 500,000 partially or fully completed medical and nursing record forms. Of these, approximately 175,000 were primary records, the remainder being duplicates, special summary forms, and index cards.

This heterogeneous mass of records was kept without reference to integration and according to the general scheme of having separate files for each unit of the department and for each specific service rendered. Thus, if the divisions of tuberculosis and nursing needed the same data regarding a case, the original record form was filed with the tuberculosis division and in addition a duplicate was made and filed with the division of public health nursing. Originals and duplicates in each division were generally filed according to residence of the individual they referred to. When some other method of classification seemed desirable, new sets of duplicates, or summary forms were made. Nearly every file had its own cross-index, separate and distinct from other

similar indices. No one individual was responsible for devising forms, instructing field personnel as to filling them out, supervising files, or for the mechanical details of analyzing records collected. Each division director independently managed his own record system and directed the efforts of clerks assigned to him.

This uncontrolled hit or miss development led both to administrative difficulties and to inefficient service. The situation arose where nurses were spending as much as a quarter of their time making out and copying record forms. This proportion increased according to the whims and desires of division directors for additional information and the subsequent installation of more and more record forms. Records pertaining to a given individual could not be assembled from the department's numerous files without undue labor and expenditure of time, if at all. Correlated analysis and study of services rendered was virtually impossible.

Since conditions similar to these in Westchester County probably exist elsewhere, a progress report of efforts to develop a more efficient record keeping system is appropriate. Such a report is given in this paper, and is preceded by a brief description of the

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organization of the Westchester County Department of Health.

This department serves a population of 314,000, so distributed as to present widely varying problems. Most of the southern half of the district is suburban to New York City and is essentially metropolitan in character, while the northern half is sparsely populated and rural. The central office is located in White Plains, a city of 42,000. Under the Commissioner are two deputy commissioners. The department is organized in the following divisions—communicable disease, sanitation, tuberculosis, pediatrics, public health nursing, syphilis, and statistics.

Although the work is for the most part administered from headquarters, clinic and nursing services are decentralized. The 24 field nurses work out of four district centers, each of which is directed by a supervising nurse and staffed with clerical personnel. Within each district are from six to eight substations. Some of these are used only for clinic sessions, and others both for clinics and the holding of office hours by nurses.

The director of the statistical division has been given general supervision of the majority of headquarters and field records, excepting those of the division of sanitation. The content of record forms and the kind of information desired are decided upon in coöperation with the various administrators and specialists concerned. However, the statistical division is alone responsible for the manner in which data are obtained, and made available for routine use or special analysis.

Three fundamental record units have been established in accordance with the organization scheme of the department. The field unit comprises files of active family folders kept in the four district offices. The headquarters unit is a series of case registers, one for each medical service. The third unit is an

essential correlating agency—a single master index located in the central office. This index cross files alphabetically all other files of the department and shows where each record for a specific individual may be located. Field records are moved after each use to the central office where clerks enter appropriate information in the case registers and index before returning them to field offices. A detailed description of each of these record units follows.

FAMILY FOLDER FILES

The family folder has been selected as the most logical and flexible unit for field files. There is a series of alphabetical files of family folders in the district nursing centers, one for each sub-center included in the district area. This single unit replaces and consolidates a former file of nursing records arranged by families, and files of medical records, arranged first by services and by individual within service. The new family folder contains the following records.

1. A family history to be used by medical and nursing services
2. Medical and clinic records for members of the household
3. Records of nurses' home visits

Incorporated in the social history sheet are a household roster and a service summary. The household roster shows for each individual, name, date of birth, sex, color, relation to head of household, date of entrance into the household, occupation, and a general description of health status. The service summary lists the members of the household carried at any time on active clinic or home visiting lists, the specific services rendered with date of admission and space for date of discharge and reason.

Medical records, so far as possible, conform schematically to one pattern in order that whoever uses them may know

the approximate location on the form of the information desired. The face sheet for each medical service contains identifying information, a medical history, and the findings of the first examination. Its reverse side and the second sheets are simple continuation forms. There is a minimum of duplication on the medical records of information already given on the social data sheet.

A form for noting the results of nurses' home visits is in experimental use. Nursing record forms in common use have been abandoned and in their place has been substituted a ruled sheet with a column at the left for a date and the name of the person to whom the notes refer. The nursing record thus becomes a chronological narrative for the entire household roughly indexed by date and individuals. Such a form is made possible by keeping histories in the same folder.

To facilitate handling what in some instances is a rather large volume of records, a special type of folder is being installed with attachments for holding records in place, as well as separate sub-divisions for segregating the various classes of records. The filing edge of the folder bears a label showing the name of the head of the household and address. Labels banded with a color, each color representing a single service, serve as signals for household counts. Figures on the labels indicating the number of individuals receiving that service are signals to be used in individual counts.

Records for discharged cases are removed from the family folder and kept in a central discharge file for the entire health district, but the fact that an individual in the household has been discharged from a service is noted on the service summary.

The folder is taken by the nurse into the field when she is making home visits; it is used by the physicians and

nurses in clinics. The folder is sent to headquarters after a clinic visit for necessary interpretation of new data by physicians and for register entry and indexing by clerks. It is held there no longer than 24 or 48 hours before being returned to the field. After a nursing visit, the folder is given to the clerks in the district offices who forward necessary data to the central office for register entry and tabulation.

The advantages gained from this type of field record are these: The number of forms in use has been reduced by at least one-third. As far as possible, records serving the same general functions have the same form and follow the same field and office routine. There is little or no duplication of information on the different types of field records. The field worker, doctor, or nurse writes one and only one set of observations concerning a case. These observations are available without copying or summarizing to other persons who need them.

CASE REGISTERS

Case registers are sets of files in the headquarters office designed to serve two functions. They are used by division directors and others for case reference and are the source of data for routine reports and special studies. Formerly files of duplicate field records served the first of these purposes, and a set of summary records were used for the second. The case registration card is an expansion of the summary form to include data required for case reference. These data, however, are entered in coded or abbreviated form. As a result the card is small enough to be manipulated easily in tabulation, and the information is in suitable form for statistical classification. Visible files of 4 x 6" cards with significant facts coded on the filing edge have proved very useful in adapting reference files to statistical use.

A series of case registers, one for each health department activity, is maintained in the central office. The individual card shows the type of observation required, the care, treatment, and follow-up service given by members of the department staff, and the results of such service together with significant dates. There are separate case rosters for each clinic service (tuberculosis, syphilis, infant and child hygiene, orthopedics, etc.), and each registers all persons who are or should be receiving care or observation from that service. The files of birth and death certificates, reported cases of communicable diseases, and a file showing the immunity status of preschool children with respect to the more important acute communicable diseases, are case rosters essentially since they register individuals who require certain types of health department supervision. By filing with them additional data regarding follow-up service, they become similar in content and function to other case registers.

In general, direct reports to the health department are noted in the registers before being passed on to the field representatives concerned and, conversely, field records after each use are sent through them for entry of new data by clerks. They are, therefore, always up to date. They impose no clerical work on field personnel. Correlated medical and nursing data are available for health appraisal, and can be amplified for special studies without creating additional field forms or disturbing the routine of field records.

MASTER INDEX

With the wide diversity and constant flow of records, it is essential to establish an integrating agency to locate all forms pertaining to a given individual, indicate where entries of new information should be made, and facilitate transfers from one file to another. The

agency selected for the Westchester County system is a master index with a card for each individual who has permanent records on file. The card shows, in addition to identifying information, the exact location of the records relating to the individual. The index cross-files registers (including birth and death certificates), active and inactive files of field records, and other miscellaneous files of the department, such as X-ray films and laboratory reports. Each record is checked with this file before being used in any other office or field procedure. The use of symbols to indicate types of records makes it possible to use a small card. A visible soundex file, such as the one installed in Westchester County where 85,000 individuals are indexed, decreases greatly the time required in looking for names.

The index has already proved to be extremely valuable in a number of ways. Other files may be arranged in some way except alphabetically when desirable. The clerical staff can locate quickly the records requiring entries of new information. It acts as an automatic device for coördinating information on file, and, therefore, substitutes one checking operation for many. For example, death certificates are checked with registers of tuberculosis and syphilis cases, with birth certificates and nurses' active cases in one simple operation. It serves as a clearing agency for changes of address, a very important function in a county such as Westchester where the rate of migration is very high.

The maintenance of this record system does not require a larger clerical force than did the original unplanned one. The transfer from the old to the new system has, of course, necessitated additional temporary clerical personnel, and 8 clerks were supplied through a WPA project for an 18 month period. Now the force is practically the same

as under the old system and is producing better data and giving better service than previously. In all fairness, however, it should be pointed out that the deficiencies of a poor system increase geometrically with the number of records involved. Possibly small county health units may not waste as much time and effort through bad record practices as does a large unit like that in Westchester County. If this is true, suitable modifications in the system might be made in applying it to small organizations.

SUMMARY

The record plan described herein emerged after considerable trial and error, from attempts to decrease the amount of record work required of field personnel, and to put data already

accumulated in such form that they could be located and used. It has these salient characteristics: The household is recognized as the primary unit of field service and a household folder of records is designated as the place to record basic data. The folder is kept permanently in the hands of the persons who use it most, namely the field personnel. Movement of the primary record to persons who require it replaces numerous special report forms and duplicates filled out by field personnel. One set of secondary records for reference and analysis, kept at headquarters and handled by trained clerks, takes the place of office duplicates and statistical summary cards. An integrating and correlating agency is created through which all new data must pass before they are permanently filed.

Industrial Medical Department Organization^{*}

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RECENTLY, considerable attention has been directed toward industrial medical organizations in large corporations. Industrial corporations employing approximately 25,000 workers or more have designed medical departments well staffed with physicians, nurses, and technicians, which have sponsored the development of industrial hygiene laboratories and have developed integrated coöperation with numerous other departments usually found in large scale industrial operations such as safety engineering, plant engineering, material specifications, group insurance, legal and compensation departments.

While this progress has been very logical and commendable, it is significant that of all this nation's workers, relatively few are benefitted by such large medical organizations. In fact, 99.5 per cent of all of the industries employ less than 1,000 workers each, and 98.6 per cent have less than 500 workers. Out of 8,838,743 so employed, only 2,159,989 are to be found working in larger establishments employing over 1,000 men. This leaves 6,678,754 workers in the smaller establishments. These figures were taken from the federal census material of

1930, and are limited to establishments reporting annual products valued at \$5,000 or more.

The medical organization of a large industrial corporation can and should be very complete. In such a department, the medical director is a thoroughly qualified physician having complete authority and control over all medical activities of the organization. The department includes physicians qualified in traumatic surgery and industrial medicine, ably assisted by a staff of industrial nurses, clerks, and ambulance drivers.

These industrial nurses ordinarily should be limited in their functions to the treatment of minor abrasions, lacerations, contusions, and other minor miscellaneous injuries. The nurse also undertakes certain treatments, does some of the redressings, and at times clerical work. All of her work is under the direct supervision of a full-time physician. For duty during the night hours, male nurses are often preferred in certain cases.

Available to these physicians and closely correlated with their work, there should be an industrial hygiene laboratory capable of routine analyses and field surveys relating to industrial health hazards and leading to the elimination or control of such hazards. It is necessary for such an industrial hygiene

^{*} Read at a Joint Session of the Industrial Hygiene and Public Health Nursing Sections of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

laboratory to be organized on the basis of properly qualified personnel including such physicians, chemists, and engineers as may be necessary to deal with the particular health hazards in any given corporation. Where such problems exist, the laboratory must be prepared to employ methods for sampling and analyzing various dusts, smokes, fumes, vapors, mists, or irritating substances. The industrial hygiene laboratory also maintains an adequate reference library; it is interested in toxicological problems, and must have contacts with local public health agencies. The industrial hygiene laboratory must be in a position to observe its corporation's compliance with public health rules and laws.

Complete coördination between the medical department and the employment department, production supervision, group insurance, safety engineering, plant engineering, and plant management, is indispensable.

However, it has been indicated already that a significant majority of the nation's workers do not fall into the classification of large scale industrial employment. This majority is employed by thousands of small manufacturers. How, then, is a complete medical service such as outlined possible to this large group of workers?

Most of these smaller plants do not operate on a sufficiently large scale to warrant the employment of a full-time physician. For some it would not appear possible to employ the full-time services of an industrial nurse. In the face of this apparent difficulty, it is none the less true that herein lies the greatest opportunity for the nurse of today who is interested in industrial nursing.

Present opportunities in industrial nursing can best be explained by discussing the qualifications of an industrial nurse, including special capabilities necessary for industrial nursing in con-

trast to other forms of nursing, and certain other qualifications which will enable her to adapt herself to the particular needs of manufacturers employing labor on a small scale.

Naturally, certain attributes such as neatness, character, and pleasing personality, along with academic attainments such as graduation from the best type of nursing school, are essential. Innate enthusiasm and interest in workers of all classes are no less important in small industries than in large plants. In the smallest industrial units, where there is no provision for attendance by a physician, the industrial nurse must be able to assume certain additional responsibilities. She should also have that rare ability to carry out certain administrative functions in a friendly manner, yet ever maintaining the dignity of her profession.

The industrial nurse must have more than these admirable qualities to fit into a small scale industry. She must be able to understand problems of management and supervision as well as those of wage earners, and in some instances act as an adviser in promoting mutual understanding between these groups. Her position in this aspect of promoting a fine employee-employer relationship is unique indeed.

While it is usually recognized that all industrial nurses are carrying out at least a type of public health nursing, the nurse in a small plant, where physicians are not employed, has an even greater need of ability in public health problems. She must be familiar with local laws and rules pertaining to public health problems and should understand the entire local program of public health agencies.

In addition to having part-time medical service, or perhaps no regular medical service, the smaller industrial unit seldom has any industrial hygiene laboratory facilities unless such are

provided by an insurance carrier. Even in the latter case the industrial hygiene coverage is prone to be scant. Therefore, it is necessary for the industrial nurse of this type to familiarize herself with many of the rudiments of that science which is now called "industrial hygiene."

Industrial hygiene perhaps partakes of the engineering, chemical, and medical professions, but is rapidly being recognized as an entity apart from these professions. It is not visualized that the average industrial nurse of this type will become an expert industrial hygienist. It is hoped that the nurse will recognize her limitations in this field and seek proper consultation in the same manner as she has been taught to do in cases of illness or injury. However, where the volume of nursing and actual first aid work is small, she must necessarily sell herself to her prospective employer on the basis of added functions, and this is one of them.

Ordinarily, any plant, however small, lists among its manufacturing operations several potential sources of occupational disease. These should be appraised and studied in particular so that the nurse may advise the management or supervision in regard to the common health problems of her plant.

In the initial appraisal of health hazards in any particular plant, it is hoped that she may be aided by some form of industrial hygiene coverage such as that furnished by many insurance carriers. This may serve to designate the outstanding health problems sufficiently so that the nurse may develop more detailed knowledge regarding these few hazards by directed reading in the literature, and contacts with physicians and scientific meetings. In Michigan last year there was formed a new society known as the Michigan Society of Industrial Hygiene whose membership is open to all persons interested in or doing any phase of indus-

trial hygiene. Particular attention is given to the problems of those doing work in smaller plants.

In many of the smaller industrial units the combined work embraced under the titles "first aid" and "industrial hygiene" may not be sufficient to warrant the employment of full-time nursing service. Therefore, in order that the nursing profession may fill this potential professional market more successfully, it should whenever possible present other qualifications such as stenography, filing, and kindred office work.

One finds it interesting to note the number of nurses who now are supplementing their professional abilities with studies in stenography and various other office routines to make themselves more valuable office assistants to physicians. Nurses who have this training can make themselves invaluable to smaller industries in the dual rôle of nurse and office worker; and, depending on their ability, can handle the personnel work for these plants in a very satisfactory manner; also, in some cases, they may increase the value of their services, where the volume of work already indicated is sufficiently small, by various other types of nursing—visiting services or social services where mutual aid or mutual insurance societies exist.

When the establishment of a medical department in a small plant is contemplated, and it is planned to utilize the services of the type of industrial nurse described herein, one initial step is advisable. In all these instances, the plant management or the insurance carrier usually has selected a nearby physician for reference in cases of compensable diseases and injuries. The nurse should consult freely with this physician and elicit his aid in the establishment of standing orders and routine treatments.

Now, it will readily be seen that, should any of these activities individ-

ually consume very much time, such a scope as outlined would be impossible. But in the smallest types of industrial units, it is preferable and will lead to greater efficiency when the industrial nurse recognizes all of the possible ramifications of her position so that she may be better prepared and better

qualified in each of these aspects rather than allowing them to be handled in a haphazard manner as problems in these different classifications arise.

Proper study and training directed along these lines will certainly help industrial nurses to make a place for themselves in small industries.

Relationship of Doctor and Patient

THE profession of medicine is one of the most individualistic of all professions. The relationship between doctor and patient is a highly individual relationship, with something of a religious character, even though the doctor has long ceased to be actually a member of the priesthood as he was in earlier times. In a country such as ours it is a very good working rule—and indeed it is more than that: it is a fundamental principle—that individual enterprise should not be interfered with by the State unless that enterprise is either injurious to others or to the community, or is failing to deliver the goods or services which the community requires. I think this principle is generally observed in the relations between the general practitioner and the State. The State or municipality can lend organizing power, and it can supplement the work of the individual by

making available facilities which the individual could not provide for himself or by creating conditions in which the individual can make a more effective contribution to the common good. But the State is not, as is sometimes supposed, a bureaucratic machine trying to bring everything under its control because of a blind worship of the Unknown God of tidiness, and, although it is sometimes accused of adding every year to the number of things in Acts of Parliament which are subject to the approval of the Minister of Health, much of the time and energy of Ministers and their Departments is in fact spent in resisting the acceptance of such control or jurisdiction because it is clear that the public interest, which must be paramount, does not require it.—Health and the State, Walter Elliot, *Brit.M.J.*, Feb. 25, 1939, p. 4077.

Practical Procedures and Limitations in Present-Day Smoke Abatement*

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NO individual was more closely in touch with smoke abatement problems than the late O. P. Hood, who was chief mechanical engineer of the U. S. Bureau of Mines; and no one had a better understanding of the difficulties involved. Asked why smoke abatement efforts do not bring more satisfactory results, he once said:

The main reason is an incorrect estimate of the kind and size of the job. When an industrial community realizes that keeping the air clean is a project of similar magnitude to keeping streets clean, providing clean water, removing city waste, or guarding the moral atmosphere, then there may be a real hope of success. We usually think of the project in too small terms. It is thought of as the dog catcher or the boiler inspector—a matter of a man or two, a job or two, a small appropriation of variable and uncertain amount, to be abolished in a fit of economy and reestablished under pressure of a vigorous minority. Even so, it is surprising how much is obtained for the effort; but the community is rarely satisfied, for the job is bigger than it was conceived to be . . .

This is a clear statement with which I believe all engaged actively in smoke abatement enforcement will agree. Misconception of the magnitude of the problem is reflected in governing ordinances and budgets which are mainly responsible for today's limitations.

THE ANTI-SMOKE ORDINANCE

Most of the anti-smoke laws now in effect are the outgrowth of ordinances written twenty or more years ago, when fuel-burning equipment was less efficient from the standpoint of smoke abatement, and when processed fuels were not as common as now, and when we knew a lot less about the subject in general.

These outmoded ordinances were prepared in the light of conditions that since have improved in many respects, not the least of which is the change in the spirit of antagonism toward regulation.

Now, as then, atmospheric contaminants come from many sources, but in an urban atmosphere, are mostly products of fuel combustion. Products of combustion are solid, liquid, or gaseous; some are visible to the eye and some are not. The visible was tangible, so the finger of accusation was levelled at "visible smoke." If it could be suppressed, it was thought the cause of general complaint would be removed. But it appeared that, for one good reason or another, it would be too drastic to prohibit the emission of all visible smoke in a soft coal burning community. Thus it was agreed that the prohibition should not extend beyond "dense" smoke—smoke that is opaque as it leaves the stack.

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But, again, it was felt that this would be too severe, so it was decided that dense smoke should be permitted for a specified limited period. No time limit was placed on "light" smoke. Cinders, ash, and sulfur gases were not mentioned—not because they were unrecognized as objectionable, but because at that time control was considered impracticable. Private dwellings and small apartment houses were made exempt as inviting too much trouble under the conditions then existing; in other words, regulation covered considerably less than 10 per cent of the total number of stacks in the city.

There you have the limits of the ordinance of ten or twenty years ago. How do they compare with those in effect today?

The *Manual of Ordinances and Requirements*, published in August of this year by the Smoke Prevention Association, analyzes ordinances of 77 cities in the United States and 3 in Canada, ranging in population from 37,000 to 7,434,000. One city is listed as permitting no dense smoke; 16 apparently limit the emission of dense smoke to periods of cleaning or building new fires (cleaning fires is a time-worn excuse); the remainder allow certain other specified periods of dense smoke. And some of the later ordinances include regulation of private homes and small apartment houses, apparently on the same basis as industrial and commercial plants.

Some progress, therefore, would seem to have been made—at least on paper. But the plant operator still can say, if he wishes, "Catch me." And further, firemen could, if they would, cause a tremendous aggregate of smoke of "permissible density." Fortunately they are not so inclined.

THE ENFORCEMENT STAFF

Since knowledge of conditions still is

dependent upon observations by smoke inspectors—in other words, direct reading and timing—the number of violations recorded will be proportional to the number of inspectors or observers. Forty-five of the 80 cities included in the report made by the Smoke Prevention Association have no full-time employees on smoke abatement. Most of them list one or more part-time—boiler inspectors or sanitary inspectors. Nineteen more have only one man. In the larger cities, while there are more full-time employees, the ratio of employees to population is low. For example, in Hudson County, N. J., and in St. Louis, Mo., the ratio is 1 to 66,000 persons; in Chicago, Ill., it is 1 to 80,000; in Washington, D. C., it is 1 to 105,000; and in Pittsburgh, Pa., the ratio is 1 to 175,000.

THE BUDGET

Annual budgets for enforcement of anti-smoke ordinances are, as Dr. Hood said, small, variable, and uncertain. St. Louis, with its new ordinance, is at the moment at the top among cities with more than 500,000 population, with an appropriation equivalent to nearly 5 cents per capita. Hudson County is next with 4 cents per capita. Then come, in order, Chicago and Washington with about 2½ cents each; Boston and Pittsburgh, each with a little less than 2 cents; Cleveland and Baltimore with 1 cent each; and Detroit with 6/10 cent.

Obviously, with such small enforcement staffs and meager budgets, anything like real supervision is impossible. As a matter of fact, the records of a bureau under such handicaps give an erroneous idea of actual conditions.

It has been possible, during the last several years, to make good use of WPA funds to secure a great deal more information than could be gotten routinely. Here is a part of the results obtained in Pittsburgh with a corps of

50 WPA observers as compared with those of the three city inspectors.

Pittsburgh has about 5,000 stacks regulated by the anti-smoke ordinance. In the exempt class there are 154,000 dwelling units, in 114,000 of which solid fuel is used. The city was divided into 50 districts and a WPA observer, after being taught to differentiate between dense smoke, medium smoke, and light smoke, was assigned to each district. He averaged 120 hours of work per month, and during about two-thirds of the time was on duty from 7 A.M. to 1 P.M., on Mondays to Fridays, and the remainder of the time his shift was from 12 M. to 6 P.M. He was expected to report time, character of building, density and duration of smoke. While even with 50 observers only a percentage of the total number of stacks was under observation at any time, the vastly closer supervision was by comparison much better than an arithmetic ratio. A summary is given in Table I for the month of March, 1938. During that month the three city smoke inspectors reported 62 violations on all classes of stacks except domestic, which are exempt from regulation.

PRODUCTS OF COMBUSTION OTHER THAN VISIBLE SMOKE

Thirty-nine of the 80 cities previously referred to have some sort of provision against excessive fly ash, fumes and/or noxious gases. Of this number, 8 apparently have regulations to cover fly ash at least; 6 require screens at the top of the stack, probably intended for rubbish incinerators; the rest either do

not specify, or they say there is no provision for enforcement.

Dust separating equipment is readily available for large and medium size plants, but these in number are a small percentage of the total. Something inexpensive and relatively efficient must be developed for the myriad of small plants. As regards sulfur compounds, there is at present no practicable method of elimination except for the largest plants. Other gases and fumes from industrial processes present other problems.

Standards of permissible dustiness or permissible noxious or obnoxious gas content of stack gases are lacking, although this problem is receiving serious study. There is also the technical and time-consuming task of sampling and analysis to determine compliance or violation which, obviously, cannot be done by smoke abatement bureaus as today constituted and manned.

PRACTICAL PROCEDURES

Requirement No. 1 for whatever success is possible, is coöperation between the bureau and the various groups with which it must deal—Coöperation with a capital "C." These groups include (1) the owners and operators of fuel burning plants, from the power plant having boilers rated in thousands of horsepower to the boiler or furnace which supplies heat for a small space; (2) manufacturers and salesmen of equipment—furnaces, boilers, stokers; (3) producers and distributors of fuel; (4) architects and engineers concerned with design and installation of plants;

TABLE I

Number of "Smokes" Reported by 50 WPA Observers

	<i>Heavy Industries</i>	<i>Light Industries</i>	<i>Commercial and Heating Plants</i>	<i>Domestic</i>
Light Smoke	586	2,215	9,590	83,698
Medium Smoke	596	1,601	5,771	28,478
Dense Smoke	436	1,263	4,299	15,317

and (5) civic bodies, the press, and the general public.

CODE OF REGULATIONS

The bureau has rules and regulations to guide those selling, or those purchasing, installing, and using fuel burning equipment. These rules and regulations are limited legally by the limits set in the ordinance. The enforcement officer will of course see that new installations and those receiving major repairs conform to those requirements.

In formulating a code, there are some excellent guides. Much of the material can be taken as prepared by national organizations, or as used in comparable cities; much can be taken from commercial catalogs. However, attention must always be given to local factors, peculiar to any community, as wind velocity, topography, fuels commonly used, etc. These may make it advisable to increase the requirements for a particular city, or even for a part of that city.

Proper capacity—boiler, firebox and combustion chamber, stoker, breeching, stack—and appropriate fuel must be insisted upon from the standpoint of operation in conformity with the ordinance. A sense of false economy may and often does prompt the purchase of equipment which, while it may give the necessary output, must over a large part of the time be forced, resulting in an excess of smoke.

Allowable output, stoker setting heights, and stack sizes will be subjects of occasional argument, where the city's requirements differ from catalog recommendations. On the other hand, the enforcement officer knows whether there are local conditions that influenced him in setting up his standards. Aside from such local conditions, those standards are, or should be set up on the basis of consideration of the type of operation to be expected, rather than

what can be done in a supervised test. Then, too, the enforcement officer cannot differentiate between makes of the same type of equipment, if all can meet his requirements in normal operation.

FIELD OBSERVATION AND INSPECTION

Since it is physically impossible for the present small number of inspectors to keep in desirably close touch with all plants, there develops a differential treatment. Some plants need frequent attention, others require very little. During the heating season the work of the bureau is multiplied. Hand-fired heating plants and many heating plants that are stokered require closer supervision than do most high-pressure installations. A large percentage of the firemen in medium size and small heating plants have other duties to perform. Fires are not given proper attention, and many such firemen know too little about firing a boiler, or furnace. Result, much too much smoke.

An important part of the field work is the handling of complaints. Some of these have real bases and the bureau is glad to have this outside assistance. Many complaints, however, are about cinder and ash rather than visible smoke; some are against odors; while many are the result of personal animus against neighbors. But, some of the complaints are justified, therefore all must be investigated.

COÖPERATION THE MOST IMPORTANT FACTOR

To return to the matter of coöperation, without which the enforcement of an anti-smoke ordinance would be extremely difficult, if not impossible.

Owners and Operators—Members of this group are, on the whole, very coöperative. They are willing to do what the city bureau requires, although at times it involves spending more than was anticipated for a new plant, replacing grates with stokers, or for

changing fuel. Of course there are inevitable exceptions where argument or even an ultimatum may be necessary, but such cases are relatively few.

Equipment Manufacturers and Salesmen—The city's requirements must, of course, be made known to the members of this group, and only borderline cases need to be discussed. The enforcement officer must not play favorites; and if a concession is asked for and made in a particular difficult case, all bidders on that job should be notified and allowed the same concession. In every way, all who are making or selling approved equipment must be treated alike. There will then be no question about coöperation.

Producers and Distributors of Fuel—It is important that the enforcement officer have a knowledge of the fuel situation, particularly with reference to processed fuels. Many distributors maintain corps of engineers who will work with the city bureau in solving difficult or aggravating problems that involve determination of the best type or grade of fuel for particular plants.

Architects and Engineers—These are concerned mostly with new buildings and plants. Obviously, the possibility of trouble can be avoided if the bureau of smoke regulation passes upon plans before the building permit is issued, so that proper boiler room arrangement and stack may be assured. I believe this is now the general practice and is welcomed by the architects and engineers.

Civic Bodies—Chambers of commerce and civic clubs usually have smoke abatement committees and endeavor to aid the enforcement officer in his task. The bureau should be represented on all such committees, so that committee-men may be kept informed.

The Press—The local newspapers are keenly interested in air pollution. They can be, and usually are, a powerful factor in keeping the subject in its

proper light before the public. This is especially true during the occasional periods in the fall and winter when, in moist air and with little or no wind, the people are sniffing, sneezing, and coughing in the smog.

The General Public—The apathy of the public toward this important matter of air purification is the principal reason progress has not been more rapid and more complete. In each community there is a small minority of interested persons, but the average individual pays no attention unless a neighbor showers him with soot, or until his city has a two or three day smog. He is then vociferous and wants immediate and drastic action. Usually the blame for smoke is laid at the doors of industry—the mills and the railroads. It is true that an increasing number of householders are asking what to do in their own homes, but the increase is too slow to be of early benefit in changing conditions in a city.

It might be of interest here to say that, last spring, 100,000 copies of a questionnaire titled "Smog and You," were sent out by the Pittsburgh Department of Public Health, acting in coöperation with the Allegheny County Medical Society, Air Hygiene Foundation, Mellon Institute, and other scientific organizations. In reply to one of the many questions: "How do you feel during 'smoggy' days?" 53 per cent of those answering reported stuffed-up nose; 62 per cent had a rawness or a tickling in the throat; 25 per cent increased coughing; 22 per cent increased sinus trouble; and 9 per cent reported feeling "as usual."

CAN SUCCESS BE ATTAINED?

I have stated briefly some of the limitations of present-day smoke abatement, and indicated sketchily what is involved in enforcement of an anti-smoke ordinance.

The question that arises naturally,

though not included in the title of this paper, is: "What can be done about it?" My answer is that it is now possible, from an engineering standpoint, to provide means for a marked advance in the prevention of air pollution. Any urban community can secure the benefits of hygienically pure and relatively nuisance-free air if and when it wants it and each individual is willing to assume his very small part of the burden.

Without a detailed discussion, I should like to close with the following statements:

Ordinances specify limits for smoke, Fuel-burning equipment need not now be designed to do more than meet those limits although much of it does.

While current regulations must be made in consideration of equipment and fuels currently available, there is no reason against the formulation of ordinances that shall be progressively stringent, with limits narrowing at specified future dates. The engineering profession is accustomed to meeting such challenges.

In considering conditions in a city, the fuel burning plants may be divided into three major groups (we are not here considering industrial dusts, fumes and gases, nor air hygiene as it is affected by pollutants other than those from the combustion of fuel):

1. Large plants having continuous engineering supervision and operated according to best practice can and usually do work well below prescribed smoke limits. Such plants could and would meet requirements more stringent than are now in effect in most cities.

2. An intermediate group includes smaller industrial and commercial plants, institutions, and the heating plants other than those in private homes and small apartment buildings. Many of these are stoked, a large percentage of the stokers being of the intermittently operating type; many are fired by hand. The human element is a large factor. Many of the firemen are inexperienced, and many have other duties than the care of the boiler plant.

3. The domestic heating plant fired, improperly more often than not, by the householder, the housewife, or the maid, is the most troublesome because of the great number, and because of the impracticability of education en masse.

If and when a community wants cleaner air and is willing to assume the obligation involved, a radical change in the ordinance might confidently place more restrictive limits on group 1. As to groups 2 and 3, it is my opinion that adequate results will be secured only if the ordinance restricts the use of potentially smoky fuel to equipment that will burn such fuel smokelessly under the ordinary conditions of operation; and, where the plant—be it industrial, commercial or domestic—is not so equipped, requires the use of a fuel that cannot smoke.

Use of Agar Slants in Determining the Sanitary Quality of Milk*

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THE growing tendency among those interested in determining the sanitary quality of milk to place more emphasis on relative rather than actual numbers of bacteria present gradually places new interpretations on older methods of enumerating bacteria. Methods which do not meet the requirements of accuracy in so far as counts are concerned become of importance if they are of value in making comparative determinations of the number of bacteria present. One of the most important methods of this type is the smear culture method commonly referred to as the Burri agar slant procedure.

It is not the object of this discussion to present the agar slope method as a new or particularly accurate method for determining the number of bacteria in milk but rather to emphasize its value as a method of determining the relative numbers of bacteria in samples of milk as well as its use for the control of certain plant procedures in processing milk and dairy products.

HISTORY

The agar slope method was originally described by Burri¹ as a method of enumerating bacteria in milk. The inaccuracies of the method as a counting procedure were soon recognized, and the method has failed to gain wide recognition as a counting method in comparison with the direct microscopic and Petri plate procedures. Later, Dorner² used the agar slope procedure in determining the number of bacteria present in freshly drawn samples of milk and reported it as most useful under such conditions. He also found that the agar slope method gave higher counts than the more commonly used standard Petri plate procedure. Several other investigators have used the Burri slant procedure^{3, 4} in various investigations, more particularly mastitis and milk plant studies. Recently Long and Hammer⁵ have presented results which indicate that the Burri slant procedure has value as a means of determining the number of organisms in various parts of masses of butter.

TECHNIC

The procedure which was originally described by Burri has not been changed materially during the period since it was first described. It consists of the preparation of the agar slopes of any

* Read before the Laboratory Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938. Approved by the Director of the New York State Agricultural Experiment Station for publication as Journal Paper No. 308, January 10, 1939.

desired composition with the provision that 2 per cent of agar be used in order that the agar may be sufficiently firm to allow surface streaking. Each tube is filled with from 6 to 8 cc. of the agar and inclined to obtain a slant about 3 inches in length. Before use, the tubes are allowed to remain for a sufficient time in a horizontal position to dry the surface of the agar thoroughly.

A standardized loop is used for measuring the amount of milk which is to be transferred to the surface of the slant. This loop is made of platinum wire 0.3 mm. in diameter and the loop so constructed as to be 1 mm. in diameter. This loop will transfer approximately .001 cc. of milk.

The loop of milk taken from the sample to be tested is touched lightly at various points from the bottom of the slant to the top, followed by a transverse streaking from the bottom to the top of the slant in order to distribute the deposited milk evenly. In removing the milk from the sample to be tested it is advisable not to insert the loop more than 2 to 3 mm. into the milk. If the loop is passed into the sample to be tested for greater distance, inaccuracies will occur because milk adheres to the stem of the loop.

DATA

One of the principal considerations in evaluating the use and accuracy of any procedure, and in this case the Burri slant technic, is a comparison

with the standard agar plate procedure which, although it is known to be inaccurate, is generally accepted as a basis for such comparisons.

Where the two procedures were compared using the same medium and temperature of incubation, it was found (Table I) that of 387 samples, 106 gave higher counts on agar plates than with Burri slants, while in 281 of the cases the count was higher on the Burri slants than on the Petri plates. A closer analysis of these results indicates that the percentage of instances in which the higher or lower counts occurred on Burri slants was not affected by the number of organisms in the original sample of milk until the number of bacteria present produced overcrowded conditions on the Petri plates. From these results it is evident that over a series of samples the Burri slant technic as a procedure will generally give higher counts than the Petri plate method, a finding which confirms the conclusions reached by Dorner.²

Burri slants are of special value when determining the presence of streptococci in samples of freshly drawn milk. In a study of 4,675 samples (Table II) of freshly drawn milk in which streptococci were not demonstrated by the Burri slant procedure, it was found that in only one of these instances were organisms evident when the sample was examined by the direct microscopic method. However, where the samples were incubated before they were examined microscopically, 55 were found

TABLE I
Relation of Burri Slants to Plate Counts
Standard Agar Plates Incubated at 37° C. for 48 Hrs.

<i>Number of Instances Where the Count Found on Burri Slants was in the Range Indicated</i>		<i>Number of Instances on Agar Plates Where there Was</i>	
		<i>an Equal or Greater Number of Colonies Than on Burri Slants</i>	<i>a Smaller Number of Colonies than on Burri Slants</i>
1,000 to 10,000	299	91	208
10,000 to 100,000	74	15	59
100,000 plus	14	..	14

TABLE II

The Detection of Streptococci in Freshly Drawn Milk on Burri Slants, and by Direct Microscopic Examination Before and After Incubation

Number of Samples	Burri Slants		Direct Microscopic Examination of Unincubated Milk		Microscopic Examination of Incubated Sample	
	Streptococci Not Observed	Streptococci Observed	Streptococci Not Observed	Streptococci Observed	Streptococci Not Observed	Streptococci Observed
4,675	4,675	0	4,674	1	4,620	55
1,372	0	1,372	1,354	18	246	1,126

in which long chain streptococci were present although none were evident on the Burri slants. The microscopic examination of incubated freshly drawn milk is one of the best procedures to demonstrate the presence of long chain streptococci. However, these figures make it evident that the Burri slant procedure is for practical purposes as accurate for use in determining the presence of long chain streptococci in freshly drawn samples as microscopic examination of the samples subsequent to incubation. At the same time, colonies are available for isolation and subsequent study.

In a study of 1,372 samples in which streptococci were observed by the Burri slant procedure, it is of interest to note that all except 18 of these samples failed to show long chain streptococci when examined by the direct microscopic procedure. However, when these same samples were incubated before microscopic examination, long chain streptococci were demonstrated in over 80 per cent of the samples. These results again indicate the surprising accuracy of the Burri slant procedure as a means of demonstrating the presence of long chain streptococci in freshly drawn milk.

DISCUSSION

The Burri slant procedure is not a method which should be considered as a substitute for either the Petri plate or the direct microscopic procedure. However, it does have, because of its simplicity and the possibility of isolating

cultures, certain advantages not found in either of the above commonly used procedures. The Burri slant method is of particular value as a means of finding and isolating the long chain streptococci that occur in freshly drawn samples of milk. The procedure may be employed with excellent results as a means of quickly finding the infected udder or quarter involved in septic sore throat or other epidemics. The amount of apparatus required is small and inexpensive (largely culture tubes) and within 30 hours streptococcus colonies are easily discernible on the agar slope. These can be removed for further study. It has a distinct advantage for this work over the Petri plate method because of the limited equipment necessary and over the direct microscopic procedure because it is possible to isolate suspicious colonies.

The Burri slant procedure also is of special value for commercial dairies and food processing establishments for use in finding sources of bacteria that may contaminate the milk or food during processing. The limited amount of equipment again allows its use in the plant and the examination of a large number of samples taken throughout the processing operation.

It is also of particular value for determining the possible cause of food suspected epidemics. In those cases where a large number of sources of offending organisms must be examined, samples can generally be secured during the field investigation and immediately inoculated onto the agar

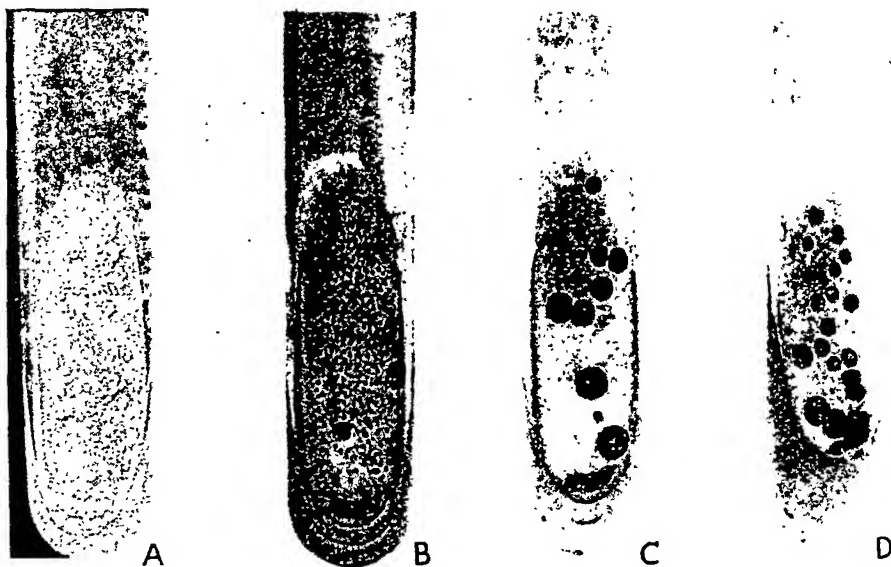


FIGURE I—BURRI SLANTS PREPARED FROM FRESHLY DRAWN MILK
A and B show a predominance of *Streptococcus* colonies; C and D show only *Micrococcus* colonies. In the latter case, the colonies may be either white, yellow, or orange, depending upon the type of *Micrococcus* present.

slopes for subsequent incubation and observation.

There are certain difficulties involved in the use of the Burri slant procedure which should be recognized. Although much more accurate than heretofore supposed, it cannot be considered, because of the rough method of measuring the amount used in the inoculation, as having great accuracy as a method of estimating the number of bacteria present.

One of the chief difficulties with the Burri slant procedure is a tendency for those who are using it in a routine manner, to place undue value on the appearance of the colonies on the slope as a means of determining the type of organisms present. In many instances, particularly where slants are crowded, the appearance of the colony is entirely different on the agar slope from the colony of the same organism where only a few bacteria are present or on agar plates. In many instances colonies of micrococci on overcrowded Burri slants will have the same characteristics

as colonies of streptococci, and may easily be so recorded.

CONCLUSIONS

The Burri slant procedure is suggested as a surprisingly simple and accurate method of estimating the number of organisms present in various substances and its availability for use in detecting sources of contamination is discussed. It is not suggested as a method for accurate counting of the number of organisms present, but it is shown to have practical value for use in controlling the sanitary quality of milk and other products.

REFERENCES

1. Burri, R. The Quantitative Smear-Culture: A Simple Means for the Bacteriological Examination of Milk. *Proc. World's Dairy Congress*, London, 1928, pp. 690-696.
2. Dörner, W. The Bacterial Flora of Aseptically Drawn Milk. *New York State Agri. Exper. Sta. Tech. Bull. No. 165*, 1930.
3. *Laboratory Manual*, International Association of Milk Dealers, Chicago, 1933, pp. 118-119.
4. Kelly, C. D. Controlling Ropy Milk Outbreaks. *New York State Agri. Exper. Sta. Bull. No. 631*, 1933, p. 10.
5. Long, H. F., and Hammer, B. W. Examination of Butter with the Burri Smear Culture Technic. *Iowa State J. Sci.*, 12, 4:441, 1938.

Public Health Engineering and Sanitation Service in a Rural-Urban Area*

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THE writer has chosen to approach this topic from the standpoint of a personal experience rather than from that of an academic discussion. In this paper it is proposed to define and describe the characteristics of the San Joaquin Local Health District.

The county is located centrally in California at the head of the San Joaquin Delta approximately 60 miles east of San Francisco. It extends eastward to the foothills of the Sierra Nevada Mountains and southwest to the Coast Range. Three streams, the Mokelumne, the Calaveras, and the Stanislaus, drain from the Sierras and discharge into the San Joaquin River in the Delta area. There are some 700,000 acres of rich agricultural land, growing such products as grapes, peaches, cherries, apricots, walnuts, almonds, tomatoes, asparagus, celery, peas, potatoes, rice, sugar beets, and grain. The abundance of water provides pasturage for many herds of dairy cattle.

Ocean-going vessels and three trans-continental railroads provide world-wide transportation facilities. Seven hun-

dred miles of paved roads in the county and direct highway connections with San Francisco and cities throughout the San Joaquin and Sacramento Valleys provide excellent intrastate transportation.

The county has a population estimated at 121,000. The City of Stockton, the county seat, has a population of 56,500 and 3 other cities in the county aggregate a population of 16,000. The rural population is 48,500 or 40 per cent of the total population.

It may be asked what bearing these characteristics have on sanitation and engineering. It is the purpose of this paper to illustrate that question and, in so doing, to develop the organization and functions of the Sanitary Division of the Local Health District.

Prior to 1923, each city had its own health department. In that year the Health District, comprising all of San Joaquin County, both incorporated and unincorporated, assumed the task of health service. The act¹ under which the District was formed is quite liberal, as can be determined from a few excerpts:

Each Health District shall have and exercise the following powers . . . to acquire, construct, maintain and operate all works and equipment necessary for the inspection of

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water, milk, meat and other foods, the extermination of rodents, and the disposal of garbage and waste . . .

To enforce all statutes relating to public health . . . and all orders, quarantine regulations and rules presented by the State Board of Health . . .

To enforce such local orders and ordinances pertaining to health and sanitary matters within the District as may be authorized by the appropriate local authorities . . .

To exercise all needful powers for the preservation of the health of the inhabitants of the district, whether such powers are herein expressly enumerated or not . . .

This grant of power is to be liberally construed for the purpose of securing the well-being of the inhabitants of the District.

The Board of Trustees consists of a representative appointed from each of the 4 cities and one from the rural area of the county. At the present time, a doctor of medicine, two dentists, an engineer, and a farmer are members of the board. Three of these are original members, and there have been only three changes on the board in 15 years. The Sanitary Division is one of 8 divisions of the organization. The Sanitary Division in 1923 included the chief, a dairy instructor, and 3 sanitary instructors. Another instructor was added in 1926, and an engineer in 1935. It is interesting to note that 2 of the original staff are still employed, and that only 6 men have been replaced in 15 years. The average tenure of office of those now employed is 10 years.

To facilitate service, the Sanitary Division has been divided into four districts with sanitary instructors in each district. The senior dairy instructor works out of the Stockton office. The chief of the division and the engineer cover the entire county on special investigations.

The yearly report for 1924 indicates that milk sanitation and food sanitation were the principal fields of activity, while housing inspection was in its infancy. There was some supervision of water supplies and sewage connections

and a preponderance of nuisance investigations.

It may be of interest to consider the activities of the division at the present time.

FOOD SANITATION

Inspection includes a check-up of sanitary conditions in each restaurant, drinking establishment, meat and fish market, bakery, grocery store, and candy shop. Considerable experimental work has been done on the sterilization of glassware in drinking establishments, but no method of laboratory check as yet has been developed which seems entirely satisfactory from the standpoint of field use. Some of the methods suggested by various writers on the subject are impracticable in a small health department. Methods which have given some useful results are: A rinse water sampling method suggested by Stone,² and a modification of the swab method as outlined by the sub-committee on the Standard Methods for the Examination of Dishwashing Devices.³

Food poisoning cases are given prompt and thorough epidemiological investigation. Cream pies, home-canned goods, poisonous mushrooms, and canned clams have been involved in some of the more recent investigations.

MILK CONTROL

San Joaquin County and its cities have passed some excellent local milk control laws. General supervision of dairy and milk supplies is under the State Department of Agriculture. This department, wherever a local health department has suitable facilities, has approved a local milk inspection service which enforces all rules and regulations of the State Department. The local service, through continuous education and judicious enforcement of the local and state laws, has succeeded in protecting the public to a high degree.

Milk control includes strict supervi-

sion of pasteurizing plants; dairy farms, milk houses and equipment; weekly laboratory checks of milk; semiannual physical and bacteriological examination of milk handlers; and general observation of dairy herds. (San Joaquin County has recently been adjudged a modified accredited bovine tuberculosis free area.) That the work of the inspection service is effective is evident by comparison. The milk score was 90.32 for the year 1923-1924, and 97.07 for the year 1937-1938. The average total count in the latter year was 7,500 for all grades and 1,800 for pasteurized milk only.

INVESTIGATION OF NUISANCES

Nuisances of all types require a great amount of attention. As one of the cardinal principles of a health department service, all complaints are courteously received and investigated. When the complaint is justified, the cause is eliminated by educational measures if possible; otherwise by court procedure.

Nuisances most frequently investigated include leaky sewers, overflowing cesspools, septic tanks, and drainage systems, promiscuous garbage disposal, odors from home incinerators, animal pens, chicken pens, vermin infestations, and insect ravages.

RABIES CONTROL

Contrary to most health department procedure, the Sanitary Division does not conduct wholesale quarantine, dog eradication, or vaccination programs. Instead, every dog bite reported is investigated thoroughly. The dog or other animal is placed under observation for a 10 day period, and at the end of that time, if no rabies develops, it is released. Any animal suspected of having rabies is held until death or killed under supervision, and the head is examined in the district laboratory. All contacts, both animal and human, are carefully traced. Our ex-

perience indicates that animal rabies seems to have a more or less definite periodicity, and this method of control has served us well. The maximum number of animal rabies reported in any one year was 96. There has not been a human death from rabies since 1921.

INDUSTRIAL SANITATION

Sanitary facilities of factories receive a general check-up. Cleanliness, convenience, and adequacy are the principal items which are noted. The main difficulty encountered in this field seems to be the inability of factory managers to estimate the number of employees correctly where work is seasonal. There is frequent overcrowding of facilities.

All schools are surveyed regarding heat, light, ventilation, water supply, sewage disposal, toilet facilities, safety hazards, and general sanitation, at least once a year.

HOUSING

The Health District is charged with the enforcement of the State Housing Act on all matters of sanitation, ventilation, and occupancy. The elimination of houses unfit for use and the general improvement of housing conditions requires time and energy. As this program usually affects someone's pocket-book, court procedure frequently becomes necessary. Overcrowding, faulty plumbing, and improper use of rooms are perhaps the most frequent violations which the division encounters. During lulls in working seasons, hundreds of agricultural and other laborers from all sections of California loiter in Stockton and congregate in cheaper lodging houses. Twelve thousand Filipinos call Stockton their home. Housing supervision in the Oriental section is a real problem.

RODENT CONTROL

The Sanitary Division has in the

past conducted several programs of rat extermination. However, most of the rodent control work is done by the County Department of Agriculture and the State Bureau of Sanitation. The division coöperates with these two agencies and gives advisory service.

AIR SUPPLY AND VENTILATION

The division has been striving for some time to improve ventilation in restaurants and places of similar nature. Many conferences have been held for the purpose of securing better hood design, and within the past two months an ordinance has been prepared which should insure a decided improvement in the air supply of eating places.

The advent of air conditioning brings with it additional problems. Many of the small installations have little or no engineering design. In fact, a so-called air conditioned establishment may actually be far more uncomfortable than before, due to uncontrolled humidity. Algal growth, mosquito breeding, and waste water disposal are related items which attend the maintenance of air conditioning systems.

WATER SUPPLY

With a few minor exceptions, all water supplies in the district are obtained from drilled and cased wells. There are 18 water supplies classed as public. A number of small joint operation supplies serve from 2 to 10 families in suburban areas. Nearly every farm home has water available under pressure and even home owners within the cities avail themselves of water so easily obtained. It is conservatively estimated that there are more than 6,000 private wells supplying water to residents of the district. The division samples each public supply 24 or more times a year. School supplies are sampled at least once a year and more often as deemed necessary. Private wells are sampled on request or when

indicated by other investigations. There are a number of areas which are subject to inundation during spring floods. Close scrutiny of water sources and advice to area residents during flood periods has been of material aid in the prevention of water-borne diseases, or, perhaps, escape from these has been a matter of good fortune. Surveys of all public water supplies, comprehending complete data, are maintained and prove invaluable as a ready source of information.

The problem of holding a high standard of water quality in private wells is complicated by the increasing use of rural areas for city-like subdivisions. A lot in these areas will average 5,000 square feet. On this lot it is necessary to establish a sewage disposal system and a water supply, as well as a home and a two-car garage. Since there are no ordinances governing the activities of well drillers, the task of well protection is approached from an educational and advisory standpoint. Many conferences with well drillers and pumping equipment men have served to secure some improvement in well construction and more satisfactory protection of the casing top.

Worthy of special mention is the water supply problem of the San Joaquin Delta, an area which lies almost wholly below sea level and is protected from flooding by earth levees. Typhoid fever seemed to be an uncontrollable disease in the early twenties. It was considered impossible to obtain a potable supply of water from local sources, as the surface waters were badly contaminated, and the underground waters were salt laden. Even though water was obtained from upland sources, the Oriental and Mexican population persisted in drinking from filthy drainage ditches and sloughs.

In 1924 the district began an intensive program of immunization and brought typhoid fever under control.

The attack rate in 1924 was 133.4 per 100,000, while in 1937 it was 11.8. The sanitation factor was not particularly instrumental in this change, but the Sanitary Division is working out a solution to the island water problem. The possibilities of water treatment with small inexpensive hypochlorination machines have been carefully ascertained by field studies on a delta ranch, and it has been proved that it is now possible to obtain a potable water supply at small cost to the property owner.

Cross-connections are a particular problem in our cities. In Stockton there are about 400 wells, with so-called "garden connections." Although the division has not embarked on any particular campaign to eliminate such connections, no new ones are being permitted, and some of the largest cross-connections are being located and changed.

SEWERAGE, INDUSTRIAL WASTES, STREAM POLLUTION

It has been pointed out that the county leans heavily on agricultural pursuits. The availability of raw products and the excellent transportation afforded the finished product have made the county a great processing center. Ten canneries, 18 major wineries, 1 cheese factory, 3 milk condensaries, 2 sugar beet refineries, 2 slaughter houses, and 1 paper products plant, mean economic well-being for a community, and a headache for the engineer. These wastes, as a separate problem, or as an additional load on sewage plants that were not designed for such loads, raise many problems. Industrial wastes disposed of in our streams during summer and fall create the greatest pollution load at the time of minimum flow. Of course, the cannery manager will assure you that the water is simply good clean water with some fruit in it. The writer,⁴ in investigations of the sewage load at Stockton, found that the treatment

plants designed for 51,000 people were attempting to handle wastes estimated at 290,000 population equivalent. A serious depletion of oxygen and a decided increase in bacterial contamination were demonstrated in the San Joaquin River. Since this investigation, the City of Stockton has constructed new sewage disposal facilities designed to handle the load.

If wastes are discharged on land, the operating factor is paramount and many field visits, coupled with education and persuasion, are needed to prevent nuisance. How many times has one heard that evaporation takes care of all of the water which is run out upon the land?

As with water supplies, complete surveys of all public sewerage are maintained. These surveys are brought up to date as major changes occur. Treatment plants in the county range from activated sludge to the lowly septic tank.

The division has made it a policy to aid plant operators in a better understanding of the problems which occur. Recently, the engineer arranged a series of meetings for the purpose of giving operators a basic understanding of the fundamentals of sewage treatment and disposal. A bulletin is issued bi-monthly for the purpose of transmitting information to the field.

The problem of private sewage disposal is of prime importance in the suburban areas. The soils of the county range from sand to black adobe, and it is a peculiar quirk of circumstance that has seen the greatest development of small homes in areas where adobe is the principal soil. There are no ordinances in the county which are designed to control private sewage disposal systems, and it is only by constant vigilance and continuous explanation that any improvement is attained. One of the most serious outgrowths of poor disposal has been the development of

the "sewer well." The sewer well is a hole in the ground drilled to water bearing strata. It is used for the purpose of draining effluent from septic tanks and cesspools. Often a sewer well and water well will be drilled to common water bearing strata on the same or adjoining lots. An amendment was made to the State Health Laws in 1935 which made such wells illegal, and many wells have since been abated under that law.

Stream surveys have paved the way for improved sewage disposal. In the past 3 years the division has made independent surveys and coöperative surveys with other agencies, such as the State Bureau of Sanitary Engineering, the State Division of Fish and Game, and the neighboring county health departments.

In a small health unit, the engineer does nearly all of the analytical work. Those of you who have not tried it would be surprised at the amount of field work that can be handled from a small field kit which can go on the seat of a boat or in the back of an automobile. It is hoped that we may preserve our streams in a reasonable state of cleanliness and still do no serious injury to the industrial plants which use them for waste disposal.

REFUSE DISPOSAL

Here again the produce industries are involved. Disposal must be made of any solid matter which is not placed in sewers; fruit wastes, grape pomace, sugar beet pulp, asparagus butts, and celery trimmings are vile-smelling unless properly cared for. Efforts are continually being made to find some use for these waste products. In the case of grape pomace, it has been found that it can be dried and used as fertilizer and stock feed. Beet pulp can be dried and used as feed or fed wet in the locality. Both methods are being used extensively.

Promiscuous garbage dumping by private individuals along the roadside, in vacant lots, and elsewhere has received much study. Better control of garbage collection in cities has been promulgated as a means of solving this problem.

SWIMMING POOL SANITATION

In California, responsibility for the sanitation of swimming pools rests with the local health department under the rules and regulations of the State Board of Health. Examinations are made of all pools in the county and recommendations are made for improvement of pool facilities. Inasmuch as the disease transmission traceable to swimming pools is still somewhat problematical and may be placed in the category of the potential rather than the actual, it is somewhat difficult to educate pool owners and operators to accept the standard of drinking water for swimming purposes. A favorable trend in the right direction can be noticed in the increased tendency of the public to be critical of swimming water. We often find people asking if the "old swimming hole" is safe. Schulmeyer⁵ has emphasized the importance of this trend in this statement:

A pool manager will be more alert to his responsibilities if he is aware that his pool patrons are cognizant and critical of any deviation on his part from fundamental principles of pool and bathhouse hygiene.

CAMP SANITATION

When the field crops are ready, extra labor is the crying need. The migratory worker follows the crops all over California, and San Joaquin County receives its share. During the past spring and summer there have been as many as 7,000 people residing in tents, trailers, and what not, and occupying any available ground which might be used. These camps, at their inception, have few or no sanitary facilities, have poor water sources, and are decidedly over-

crowded. During the season, the entire department is busy visiting transient camps. The principal activity of the Sanitary Division is, of course, the protection of water, improvement of sanitary facilities, and protection against insect-borne diseases such as malaria.

Strangely enough, whether privies of the home-made variety, privies of the U. S. Public Health Service variety, or modern water flush toilets are provided, patrons soon create a filthy condition due to their personal habits. Camp patrols must be rigidly maintained or conditions quickly get out of hand. Certainly such situations offer huge opportunities for education in personal hygiene habits.

In so far as the enforcement of rules and regulations regarding auto camps is concerned, outside of incorporated areas the Health District has no special jurisdiction. By legislative enactment, the State Division of Immigration and Housing was given general control of auto camps in 1931. However, there is a close spirit of coöperation between the local division and the state on all matters of camp sanitation.

There are four mountain recreation camps which are used by San Joaquin County residents and maintained by local organizations. Although these camps are outside the jurisdiction of the Health District, annual visits are made and suggestions are offered for the betterment of all phases of sanitation.

MOSQUITO CONTROL—MALARIA

San Joaquin County has a number of small streams heading in the foothills, which dry up early in the year. As these waters recede, excellent breeding areas are formed.

Eight irrigation districts maintain some 1,500 miles of canal. One thousand miles of drainage ditches carry excess water to tule-grown sloughs and

400 miles of navigable water in the Delta. Twenty-five hundred acres of rice and 8,000 acres of Lodino clover dot the county with miniature lakes. Potholes and seepage channels are prevalent in the flood lands adjacent to the Mokelumne and Stanislaus Rivers. Poorly constructed cesspools, storm water catch basins, and undrained vacant lots are found in suburban districts.

With this rich field of breeding areas to choose from, it is always possible to find mosquitoes. Perhaps the more troublesome of the pest mosquitoes are *Aedes Vexans*, *Aedes Varipalpus*, and *Culex Tarsalis*. *Anopheles Maculipennis* is the prevailing anopheline, although others are present.

Malaria has always been more or less of a problem. Available historical records indicate two peaks of malaria, one in 1917 and one in 1934. Careful epidemiological investigation of each case of malaria is made by the engineer. There is little doubt that the influx of transients from Oklahoma, Arkansas, and Texas precipitated the peak of 1934. Our records show that 59 per cent of the cases were in itinerants. Coöperation of the medical profession in the county made it possible to obtain laboratory confirmations on 86 per cent of the cases reported in 1937.

The district carried on control measures in malarial areas for 4 years. At the present time, advisory service is given groups and private individuals. In the case of local nuisance, remedial measures are required.

INDUSTRIAL HYGIENE

Industrial hygiene is a new field in public health work in California. A State Industrial Hygiene Service was formed in 1937. The engineer and health officer are coöperating with the state on many local problems, among which may be mentioned the use of carbon tetrachloride in dry cleaning establishments, and carbon monoxide

asphyxiation from motor vehicles. Plans are now being made for surveys in wineries to determine the hazards which may exist.

PUBLIC HEALTH PLANNING

It was recognized many years ago that the health agency had an interest in planning, yet as recently as 1927 Dr. Sippy states:

Nevertheless, despite the basic health principle involved in the housing and city planning program, it is all too frequently customary to omit the advice of the health department or its members.

Today the picture has not been materially altered. Even the modern planning engineer of present-day cities rarely attacks planning problems from the public health viewpoint. Perhaps one of the most urgent planning problems in the health district is that of suburban building beyond purely arbitrary city limits. The sanitary hazards have been mentioned elsewhere but are worthy of repetition. Improper sewage disposal, endangered water supplies, overcrowded houses, courts, and apartments, structurally unsound buildings, all challenge the Health District to exert its efforts toward better planning of suburban developments. Analyses of living costs which show false economies, and potential health hazards of the unsupervised community have been canvassed and placed before many people. The answer is "Yes, but I don't have to pay any city taxes."

Within the last two years the Federal Housing Administration program has offered an excellent entry to better health planning. The Federal Housing Administration requires that all private sewage disposal systems and water supplies of houses insured by it shall have certificates of approval from the local health authority. The district has adopted standards which will guarantee a reasonable protection of the home owner and his investment, and these

same standards are used as a basis for recommendation on all private water supplies and sewage disposal systems within the jurisdiction of the district. Since the start of the program, the district has certified 59 water supplies and 91 sewage disposal systems on recommendation of the engineer. Recently one entire subdivision has made Health District approval of the water and sewerage systems a requirement. The Federal Housing Administration is also insisting on better standards of construction, lot area, etc. An architectural inspection service is maintained by the Federal Housing Administration for this purpose.

Political subdivisions within the district are now frequently requesting assistance in the preparation of enforceable ordinances pertaining to sanitation. Auto and trailer camp, and garbage ordinances have been prepared recently.

ENGINEERING

The engineer's part in the work of the division is not easy to define, as he both complements and supplements the work of the remainder of the staff. He serves as an assistant and adviser to the staff on many special problems in the field of food sanitation, dairy sanitation, nuisance investigations, industrial sanitation, housing, air supply and ventilation, refuse disposal, and camp sanitation. Activities which are predominately engineering functions include water supply, sewage disposal and stream pollution, swimming pool sanitation, mosquito control, and industrial hygiene. Public health planning, and public health education are functions of the staff individually and collectively.

DISCUSSION

How do the division activities correspond with the work which is thought to be within the purview of

sanitarians and engineers? Hyde⁷ has divided typical problems and activities in environmental control into 10 general classifications. It would be almost a repetition of our activities to name them. Some of the items he mentions are coöperative enterprises under state jurisdiction; others, due to local conditions, may require only a minimum of attention. Yet there remains little in his classification which has not become a part of the local sanitation service.

Thus a well coördinated staff of four sanitary instructors, a dairy instructor, an engineer, and the division chief, under a health executive who comprehends the full scope of environmental sanita-

tion, serves a county which, due to its characteristics, offers nearly every problem which is considered within the field of sanitation.

REFERENCES

1. Local Health District Act. California Statutes 1917:791.
2. Stone, R. V. Private correspondence with writer.
3. Hitchens, A. P., *et al.* Examination of Dish Washing Devices. *A.P.H.A. Year Book, 1936-1937*, *A.J.P.H.*, Suppl. 27, 3:45 (Mar.), 1937.
4. Ingram, W. T. The Relation of Industrial Wastes to the Sewage Load at Stockton, California. *California Sewage Works J.*, 8, 1:30, 1935.
5. Schulmeyer, C. W. Mother, May I Go Out to Swim? Indiana State Board of Health, *Month. Bull.*, XLI, 6:107 (June), 1938.
6. Sippy, J. J. Relation of City Planning to Public Health. *Nation's Health*, 9, 6:25 (June), 1927.
7. Hyde, C. G. The Trained Public Health Engineer in Health Departments. *A.J.P.H.*, 26, 7:697 (July), 1936.

A Simple Tellurite Medium for *B. diphtheriae*

NELL PETERSON HALL

*Branch Laboratory, State Department of Public Health,
Champaign, Ill.*

SEVERAL media containing compounds of tellurium have been devised for the isolation of *B. diphtheriae* from mixed cultures. These have been rather difficult to prepare and, for that reason, have not been used in small laboratories and hospital laboratories.

A medium was sought which would be easily prepared yet give as good results as other tellurite media, allowing a more rapid isolation and identification in pure cultures.

HALL'S TELLURITE MEDIUM

Dissolve 4.5 grams of Bacto Cabbage Infusion Agar in 100 cc. of distilled water. Sterilize at 15 lbs. pressure for 30 minutes. Cool to 55° or 60° C. Add 10 cc. of citrated or defibrinated blood (sheep, ox, horse or human) and 10 cc. of a 0.5 per cent aqueous solution of potassium tellurite. The tellurite solution may be stored in the icebox and kept indefinitely.

Pour in plates and cool with tops tilted. Plates are not easily contaminated.

Plates of the medium may be inoculated directly from swabs or from cultures on Loeffler's medium, and it should be noted that at least 18 to 24 hrs. incubation of the plates is as a rule necessary for the naked eye recognition of colonies. Smears may be made and

examined, however, after overnight incubation. In making smears, the entire surface of the inoculated medium should be scraped with the loop to obtain the growth.

Among the numerous advantages possessed by this medium are:

1. It completely inhibits organisms, such as staphylococcus, streptococcus, *M. catarrhalis*, pneumococcus, etc., while the diphtheria bacillus and organisms of the diphtheroid group grow uninhibited, with typical colony appearances. *B. diphtheriae* grows typically as a round, smooth colony, greyish-white or black in color.

2. Petri dishes may be prepared well in advance of the time they are to be used. Plates prepared and kept at icebox temperature 2 or 3 weeks were found to give equally as satisfactory results as those freshly prepared.

3. The medium may be made in very small amounts, making it valuable for small and hospital laboratories.

4. It is especially valuable in the isolation of mixed cultures for tests of virulence.

5. Several cultures (10 or 15) may be put on one plate by marking sections with a red wax pencil.

6. A higher percentage of positives may be obtained on cases for quarantine release. A pure culture of *B. diphtheriae* may be had on this medium with a negative one on Loeffler's medium.

7. It has the advantage over Loeffler's medium of being easy to prepare, and a higher percentage of positives may be obtained.

8. The organisms are much larger than on Loeffler's medium.

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EVART GRANT ROUTZAHN

THIS Association has mourned the passing of many persons whose genius has touched its affairs. None were loved more than E.G.R. He wore his mantle of greatness with such unconcern that few were conscious of his immortal spirit until after he had passed by. He was in every sense an apostle of health, loved for his simplicity, his enthusiasm, his essential shyness, his good humor. Like every great teacher his lessons were free of cant and dogma, shunning pompous theory and high sounding phrase.

Mr. Routzahn was born in Dayton, Ohio, January 6, 1869, and was educated in the public schools there. His interest was in social work which he followed for several years. He directed a traveling exhibit for the National Tuberculosis Association from 1906 to 1912. Thereafter, until his retirement in 1934, he was Associate Director of the Department of Surveys and Exhibits of the Russell Sage Foundation.

He joined the American Public Health Association in 1912 and became a Charter Fellow in 1923. In July of that year he began editing the section on Health Education which has been a distinguished part of the *Journal* ever since. His last contribution to this section appears in this issue. There, too, will be found an expression of the regard of his fellow workers in the Health Education Section and in the Committee on American Museum of Hygiene.

For many people Health Education meant E.G.R. Rarely has the personality of one man been so clearly identified for so long with the leadership of a movement. Younger members will forget that he was the first paid employee of the National Tuberculosis Association. He piloted the first tuberculosis exhibit—caravan fashion—over the country, and left in its trail a series of enthusiastic committees most of which developed into local associations that ultimately became a part of the vast machinery for popular health education developed by that association.

It should never be forgotten that it was he who gave health education a place

in the sun in official health work by his successful efforts to establish a Section on Health Education in the American Public Health Association. He worked for recognition of health education as a specialty at a time when to many it was only a name designating a vague activity without technic, method, or purpose. The Section was created largely through his single-handed labors, and in its second year he was one of the three Fellows it could boast. He lived to see it assume its true prominence among the ten Sections, both in numbers and in weight, with a total membership of 600 and a Fellowship of 105. It was typical of him to accept the Vice-Chairmanship of the Section in its first year. He served as Chairman in 1923, and later assumed successively the Secretaryship and again the Vice-Chairmanship. At the Association's New York City meeting in 1937, on the occasion of the Section's 15th anniversary, the Section commemorated that event in the only appropriate fashion—by a testimonial luncheon to Mr. Routzahn. To the many who attended, it was apparent that the accomplishments of the Section and the accomplishments of E.G.R. were one and the same thing.

This many-sided man leaves behind him a record in social work publicity and in adult education as brilliant as that in health education. The members of this Association knew him best in the field of health education, although his book, *Publicity for Social Work*, published in 1928, was as familiar to them as to the social workers for whom it was written. His wife, Mary Swain Routzahn, collaborated with him in the preparation of a similarly widely known *A.B.C. of Exhibit Planning*, published in 1919.

Mr. Routzahn was first and last a collector. He collected friends, converts, ideas, gadgets. His collecting propensities brought rich returns to those who haunted Health Education and Publicity Headquarters at the Association's Annual Meetings. He had built up an encyclopedia of health education materials over a period of twenty years and it was from this incredible store that he drew for the exhibit he conducted each year.

Mr. Routzahn happily combined in his character and intellect the patience of the collector, with the organizing vision of the teacher. His advice has been sought by countless organizations and individuals everywhere. His painstaking efforts to record and portray for his professional colleagues new ideas, suggestions, and improvements in the thousand and one specialized technics embraced in health education, placed his name on many lips, and made him an "institution" within the public health movement—a position which he occupied with modesty and simplicity that in themselves are marks of greatness.

He was a being who loved life and he never lost his youthful spirit.

SANITARY REGULATIONS AS TRADE BARRIERS

PUBLIC health legislation has one and only one legitimate purpose. It is enacted solely to provide legal means for the protection of the health of the people. This it accomplishes by imposing such reasonable restrictions upon the conduct of life, liberty and property as are necessary to promote the common health and general welfare.

Health legislation is not intended as an instrument to favor local business at the expense of outside industry. In recent years, however, there seems to

have been an unfortunate tendency to employ sanitary regulations as an obstacle to the free movement of commerce between the states.

Many specific instances of the misuse of health legislation in placing drastic restrictions upon the legal right to market wholesome commodities, particularly dairy products and other foods, are given in a special report recently submitted to the Secretary of Agriculture by the U. S. Bureau of Agricultural Economics.¹ Health officials will find much that is interesting and provocative in this well documented report.

While conceding that laws and regulations adopted by states, counties, and cities have helped to bring about a tremendous improvement in the sanitary quality of our market milk supplies, this report points out that licensing, inspection, and pasteurization requirements are often discriminatory against outside business, and are enforced in such a manner as to limit the sources of dairy products to local business. As a remedy for this situation, the suggestion is made that Congress adopt uniform sanitary requirements for all dairy products moving in interstate commerce.

Reasonable and valid public health legislation, properly enforced, may of course affect private business, but it is a fundamental principle of law in this country that all such legislation must so operate as to afford to everyone the equal protection of the laws.² State health laws may also legitimately interfere with interstate commerce, but only when their exercise under the police power of the states bears a real and substantial relation to the protection and preservation of the public health. Real or alleged economic necessity is no justification for the capricious use of public health legislation.

The courts of last resort of this country have frequently upheld the legal principle that public health legislation is constitutional and its enforcement by executive departments is valid only when such legislation has an actual public health objective. The courts will look behind the laws for the motives that have actuated their adoption.

Thus, where a city health department attempted by regulation to restrict arbitrarily the inspection area for dairy products entering the city, it was held recently by a United States District Court that the regulation was invalid as an unwarranted interference with a legitimate business.³ So long as the product is wholesome, it cannot be prohibited merely on the capricious grounds of distance.

There are numerous other court decisions to similar effect.⁴ The United States Supreme Court has ruled, for example, that it is unreasonable and improper for a state to require a wholesome food product to be colored pink so as to distinguish it from the competing products of local merchants.⁵

Public health officials are guardians of the people's health, and not monitors for local industry. Free movement of trade between the states is an essential feature of the American plan of government. Health authorities should stick to their own last, and leave the troublesome economic problems of industry to the tender mercies of other appropriate agencies.

REFERENCES

1. Taylor, G. R., Burtis, E. L., and Waugh, F. V. *Barriers to Internal Trade in Farm Products*. Washington: U. S. Government Printing Office. Mar., 1939.
2. Tobey, J. A. *Public Health Law*. New York: The Commonwealth Fund (2d ed.), 1939.
3. Miller v. Williams (1935), 12 F. Supp. 241.
4. Tobey, J. A. *Legal Aspects of Milk Control*. Chicago: Int. Assn. Milk Dealers, 1936.
5. Collins v. New Hampshire (1898), 171 U. S. 34. See A. Magnano Co. v. Hamilton (1924), 292 U. S. 42.

PROPRIETARY MEDICINES

THE scientific practitioners of medicine have set up for themselves in recent years a rational therapy in so far as the use of drugs and medicines is concerned. The underlying principles of a rational therapy should be known to every public health official and worker. All medicines should first be classified into secret-formula and non-secret-formula medicines. The terms, proprietary, patent, and nostrum should be well understood. Proprietary means one in which there is some ownership right. It may be a copyrighted name or design on the package or the package itself. It may be that the method of manufacture is not open to everyone. It may have a secret formula. The fact that it is a proprietary medicine does not of itself classify it as either good or bad. One should be opposed as a matter of principle to all secret-formula medicine. There is no such thing as a patent medicine any more. When one uses this term he usually is thinking of a nostrum. Official medicines are those that appear in the *United States Pharmacopoeia*,* the *Homeopathic Pharmacopoeia* of the United States and the *National Formulary*. They appear here under definite names and whether they be a single drug or chemical or combinations of either or both they have definitely non-secret-formulae. Nonofficial medicines comprise all medicines not found in these three books. Of the nonofficial medicines there is a recognized list that is an accepted one. This list comprises some four hundred non-secret-formula medicines found in *New and Nonofficial Remedies*, which is revised annually and to which supplements are issued oftener. The *United States Pharmacopoeia*, the *National Formulary* and *New and Nonofficial Remedies* taken together contain about 1,670 non-secret formula medicines. Should not this be enough for any practising physician or for any hospital? Just think what a joy a medical mathematician could have with combinations and permutations.

The new Food, Drugs and Cosmetics Act passed June 25, 1938, and entirely effective (some parts became effective upon passage) June 25, 1939, will be helpful in giving physicians, hospitals, and consumers much needed knowledge of nostrums. The Act explains that the term "label" means a display of written, printed, or graphic matter upon the immediate container of any article and requires that any word, statement, or other information on the label must be on the outside wrapper also, or the outside wrapper be such that the label is visible through it. The term "labeling" in the Act means all labels and other written, printed, or graphic matter upon any article or any of its containers or wrappers, or accompanying such article. The Regulations add that labeling includes all written, printed, or graphic matter accompanying an article at any time while such article is in interstate commerce or held for sale after shipment or delivery in interstate commerce. This new law requires that a medicine for use by man which contains any of the 17 listed narcotic or hypnotic substances such as barbituric acid, morphine, cocaine, etc., or any chemical derivatives of them that have been designated by regulations as "habit forming" shall contain on the label the name, quantity, and percentage of such substance with the statement "Warning—May be habit forming." The new law also requires that drugs not designated solely by an official name (nonofficial ones) must bear on the label the common or

* Recognized as an official compendium in the Food, Drugs and Cosmetics Act of June, 1938.

usual name if there is one, and if made from two or more ingredients the common or usual name of each ingredient and the name and amount of alcohol, bromides, acétanilid, amidopyrine, thyroid, and fifteen other drugs or any derivative or preparation of them. It explains that if compliance with "this paragraph is impracticable, exemption shall be established by regulations"; but it is difficult to think of a case where it is impracticable. All medicines given an official name must comply with official requirements or else state on the label just how they differ from the official drug.

Physicians and hospitals should limit their drug usage to U.S.P., N.F. and N.N.R. drugs, for, as rapidly as new drugs are clinically tried and found worthy they will be included in one of these works. If it were then possible to convince physicians, clinics, hospitals, and public health officials that whenever case histories are taken the patients should be asked about medicines they have taken recently, some very valuable information would be obtained. It might even lead to learning the cause of some ills. Do we have illnesses due to nostrum taking? It is true that many patients may not always give this information or may give it only in part, but the amount collected would surely be enlightening. A beginning might be made with cathartics, hypnotics, and analgesics, and whoever does this faithfully will in all probability extend his questions later. Someone should make a study of this subject.

PUBLIC HEALTH EDUCATION

THIS section of the Journal is printed for the first time in many years without an asterisk following the title and referring to the modest footnote "Please address questions, samples of printed matter, criticism of anything which appears herein, etc., to Evart G. Routzahn, 130 East 22nd St., New York, N. Y."

Countless readers have obeyed that direction and turned to Mr. Routzahn for advice and assistance on subjects of such diversity and range as to defy classification.

The abundant source of variegated information which was Mr. Routzahn and the knowledge he shared so generously through this Section and through correspondence are removed by death. Evart Grant Routzahn, the familiar E G R, died on April 24.

The Editorial Board removes the asterisk with profound regret and presents here his unfinished and interrupted work—the work upon which he was engaged for this issue, and which is his last contribution to the *American Journal of Public Health*.

When the Western Branch Meets—July 23–28, 1939, in Oakland, Calif., the Western Branch, A. P. H. A., will offer to—

... members who are interested in health education of the public and health education in the schools an outstanding Health Education Symposium which will take place on four separate half days during the week. Except for one address by an outstanding guest speaker, there will be no formal papers. The Symposium will be presided over by an authority in the field of health education. The entire group will be divided into two main sections—one devoted to school health education, the other to health education of the public. The school health education group in turn will be divided into at least three divisions—one on classroom teaching, one on school health service, and one on physical education and recreation; each of these divisions to be given ample opportunity for round-table discussion of its particular problems and presided over by an outstanding leader in this field. The group interested in health education of the public will in turn be divided into at least four divisions: one on the spoken word; one on printed materials; one on radio, cinema, and pictures; and one on museums and exhibits; each led by an

outstanding authority. After each division has discussed its problems, all will come together under the section chairmen to hear and discuss a summary by each division chairman. The final session will be for the purpose of hearing and discussing a summary report from the two section chairmen, the address of the guest speaker, and a final summary and integration by the general chairman.

Say It With Pictures—If one has a story to tell and is willing to use pictures with a few words only, *Children's Museum News*, monthly issued by Children's Museum, Park Place, Brooklyn, N. Y., is worth examination. Pages are 7 by 9 inches; one or two photographs on each page (they "bleed" to one or more edges of the page); with 30 to 90 words in black face type on a page; dull finish paper.

In the Recent Past—Farm and Home Week, an annual event at Cornell University, included two health lectures a day under auspices of Division of Public Health Education, New York State Department of Health.

Are You Approved by Your Secretary?—How good your secretary is depends quite a lot on how good a boss you are. For everyone doing a health education job is "How to Be a Hero to Your Secretary," by G. Torson, *Saturday Evening Post*, Jan. 7, 1939.

Why Not Use the Blackboard?—Quoted from *The Reporter*, New York (Nov. 1938):

The speakers should use the blackboard to illustrate their talks. With the exception of . . . and . . . , all of the speakers let go a barrage of chatter which would have been infinitely more effective if they had used the blackboard which was available for illustrating their talks.

Why not begin in staff meetings and committee meetings?

A Newspaper Health Supplement—The special edition for 1939 opens with *Better Health*, a tabloid section of *New Haven Sunday Register* for February 26, 1939. 10 cents. A well selected range of contents prepared by state and local authorities.

New Postage Rates—Those who issue books or pamphlets of 24 pages or more, will wish to study the new postage rates for books. Annual reports do not benefit by these rates.

Social Work Year Book—"Social Work Year Book" for 1939 (Russell Sage Foundation, New York, N. Y.) renders a valuable service, even though adult health education receives scant recognition in a sentence or paragraph here and there. Only one of these references of two words gets into the index. Paragraphs will be found on pages 236, 332, 337-338, 419-420, with minor references on pages 333, 335, 336, 340, 341.

For Children—A series of sheets with letters and pictures in outline for coloring come from Health and Clean-

liness Council, Aldwych House, Aldwych, London, W. C. 2. The 4 sheets are 6 by 9 inches. In view of the wide variety of material offered commercially for coloring by children, more use of the idea might be advantageous in health education.

Social Hygiene Publicity Aids—A "Social Hygiene Kit" is offered free to agencies sponsoring community or group meetings. Includes program suggestions: press book with news stories, editorials, etc; talks and spot announcements for radio; lists of available literature, films, exhibits, and other materials; much material on syphilis campaign. Address: American Social Hygiene Association, 50 West 50th Street, New York, N. Y.

Health Magazines—The February, 1939, issue of *Bulletin*, National Tuberculosis Association, 50 West 50th Street, New York, N. Y., includes a helpful annotated list of popular and professional health periodicals. This seems important enough to republish in the *Journal* in several installments. When completed we hope to hear from readers who believe that any omitted periodical should be included. It is likely that libraries would be interested in this check list.

Says the *Bulletin*:

Readers of the *Bulletin* are calling upon various sources for information on magazines and journals in the field of public health. The National Health Library, to which the National Tuberculosis Association contributes, carries a regular file of more than 500 periodicals. Miss Isabel Towner, chief librarian, has prepared for the *Bulletin* a list of some of the frequently used periodicals. We publish this list below with brief annotations as to the type of publication. This list does not include strictly medical journals although from time to time they publish articles of interest to health workers.

Annual Reports—"Visual Review: 1939" is the annual pamphlet issued for school people by Society for Visual

Education, 100 E. Ohio Street, Chicago, Ill. *Free*. Its value to public health workers is in its fresh glimpses of what the schools are doing in audio-visual education. We need to know what is going on inside the schools if we wish to be coworkers, and not merely outsiders trying to inch our way into the schools.

FOR EDUCATION OR REFERENCE

"Are You a Mouse?" Or, will you fight for cleanliness in eating places? Reprint from *Health Officers News Digest*, 30 Rockefeller Plaza, New York, N. Y. *Free*.

"Free and Inexpensive Materials: Maternal, Infant, and Child Welfare." Pamphlet sources. *American Journal of Nursing*, 50 W. 50th Street, New York, N. Y. April, 1939. *35 cents*.

From Bureau of Home Economics, Department of Agriculture, and to be ordered through Superintendent of Documents, Washington, D. C.:

"The Farm-Housing Survey." Physical features of 595,853 farmhouses, *15 cents*.

"Housing Requirements of Farm Families in the United States," by M. Wilson. Suggests "desirable features of comfort and convenience." *10 cents*.

"Make Safety a Habit" is a 172 page pamphlet on personal safety practices issued for the guidance of employees of Continental Oil Co., Oklahoma.

The ninth in a series of annual publications in the interest of street and highway safety. "Lest We Regret" is a 36 page pamphlet in which pictures and text, diagrams and statistics are presented to arouse a sense of responsibility and a desire to do something about highway safety. Quantities for distribution to clubs, schools, and other organizations supplied upon request. Permission is given to reprint anything in the pamphlet. Glossy prints and mats will be available.

"Snakes: How to Know · Friend

from Enemy," by R. S. Eaton. *Red Cross Courier*, Washington, D. C. April, 1939. *10 cents*. Myths and facts; and facts to lessen the death rates.

"Syphilis and Your Town" is a 12 page folder supplementing "Syphilis: Its Cause, Its Spread, Its Cure." Both from U. S. Public Health Service, and sold by Superintendent of Documents, Washington, D. C. \$1.00. for 100 copies.-

The new issue describes the situation in a city of 100,000, and outlines nine major elements in a control program adaptable to different communities. Based on a series of 9 questions.

"These Accidents Were Caused, They Did Not Merely Happen" heads a 2 page spread in *California Safety News*, Sacramento. March, 1939. There are 14 case stories of accidents and what caused them.

"What Councils of Social Agencies Do." Community Chests and Councils, 155 E. 44th Street, New York, N. Y. \$1.00. Background information for health agency members of local councils. The chapter on "Education" includes both self-education and community education.

"What's Your Score?" is a set of statements, some true, some false, which appear in a back page of *Hygeia* in March, 1939 (535 N. Dearborn Street, Chicago, Ill.). The statements are based on articles in the same issue of *Hygeia*. Whether true or false is indicated (on another page) with page reference to the supporting information.

The Department of Social Welfare and Public Health, American Home Economics Association, has a Committee for the Exchange of Radio Scripts. The committee now offers 15 scripts in narrative form, and 31 dialogues, most of which have to do with foods and nutrition. Borrowers pay postage both ways. For a list of scripts, write to:

Pauline Murrah, Nutrition Consultant, Dept. of Health, 125 Worth St., New York, N. Y.

A "different" mimeographed report is that issued by the Anti-Tuberculosis League, 6101 Arcade Building, Seattle, Wash. Letter size pages; one side each leaf blank; large size cartoon characters on several pages ask significant questions—which are answered. A slightly more opaque paper would have given a better effect, and slip sheeting would have aided.

"Health Promotion Week" in Illinois. May 1-7, 1939. State Department of Health, Springfield.

MAGAZINE ARTICLES

"April May-Day," by E. S. Countryman. *Public Health Nursing*, 50 West 50th Street, New York, N. Y., February 1939. 35 cents. Some drawbacks; how to get the most out of the day.

"Hospital Visitors." Editorial. *Hospitals*, 18 E. Division St., Chicago, Ill. April, 1939. Some problems to be met. By means of the radio, leaflets, and the press, the community should be brought to the realization that visiting the patient in a hospital may be misdirected sympathy which taxes the strength of the patient and retards his speedy recover. (With much wider

application than the hospital.—Editor)

"Prompt Registration of Copyright and Its Publicity Value," an article in *Publishers Weekly*, 62 W. 45th St., New York, N. Y. (Feb. 18, 1939; 15 cents) tells how it is to the advantage of publishers to send their new books promptly to Library of Congress. The delinquents include many special organizations or their small city publishers.

"Selling Health in the Mountains," by E. L. Tiffany. *Public Health Nursing*, 50 West 50th Street, New York, N. Y., Feb. 1939. 35 cents.

A colorful tale of a nurse's work with the hill people of Eastern Tennessee, where the health department is introducing itself to a people hesitant to accept change.

NEW

Not new in B.C., but new to us is *Bulletin*, British Columbia Board of Health, Victoria. Mimeographed.

"Contents" on cover. A brief article about "A woman who made history," distributed by the Health League of Canada, shows a good use being made of "Typhoid Mary."

Health Section News Letter. World Federation of Education Associations, 200 Fifth Avenue, New York, N. Y.

EVART G. ROUTZAHN

MEMBERS of the Public Health Education Section of the American Public Health Association deeply mourn the loss of their leader and friend, Evart G. Routzahn. It is almost impossible for us to think of the Section without him for it was his personality that gave it zest and color. At a time when only a scattered few were giving serious thought to health education as a specialty of public health E G R saw the advantage of banding such workers together. He nursed the foundling Section, laid on the doorstep of the American Public Health Association, until it was accepted as a lusty member of the public health family. All through the years he guided its stumbling gait and happily he enjoyed the satisfaction of seeing his child grow sturdy and respected.

Though E G R never sought honor nor office, both were thrust upon him and he carried them well. For the sheer love of the cause he labored for

its well-being. Each month his cryptic paragraphs in the *Journal* stimulated us; many of us turned first to his pages. Annually his exhibit was the rallying place of all loyal members of the Section, and many a youngster and veteran in the field of health education found treasure there. To E G R we turned often and never in vain. With the advice he gave there was always a glint of humor, with his service always a beaming smile. His criticism, eagerly sought, was always penetrating but never with a sting. Mostly we loved him for his friendliness—for his bubbling good will.

We thank God that the bench-mark E G R is indelibly impressed upon the Public Health Education Section. Time, which mellows sorrow, will never efface that bench-mark. We who worked, and planned, and laughed with him have been enriched by the comradeship, and that wealth grows more precious with his passing.

AN APPRECIATION
of
EVART GRANT ROUTZAHN

Adopted by the Committee on American Museum of Hygiene of the American Public Health Association, upon his death, April 24, 1939.

EVART GRANT ROUTZAHN, pioneer in health education and member of the Committee on American Museum of Hygiene of the American Public Health Association, died in the City of New York on April 24, 1939. Whereupon the following minute was adopted by this Committee:

Upon his death, the Committee on American Museum of Hygiene wishes to express appreciation of the singular service Evart Grant Routzahn has ren-

dered the public health movement and the American Public Health Association, through the latter's Committee on American Museum of Hygiene, of which he was a charter member; and to record the admiration and affection with which his rare ability, tact, and generous devotion in the cause of health education have inspired his associates on this committee.

An intimate friend and adviser of individual members of this committee, Mr. Routzahn gave his discerning insight, sagacious judgment, and broad experience to the initiation of formal health education technics in the United States during the past quarter century

and to many other philanthropic and professional services devoted to promotion of the general welfare. He was among the pioneers in health education who maintained a courageous confidence in the utility of visual educational method in raising the level of national vitality by spreading health knowledge among the masses. To this cause, long retarded by meager resources and professional apathy, he gave generously of his time and energy; and by contribution of his vision, steadfastness of purpose, and creative leadership, helped to make the work of this committee effective and its influence widespread.

It is of special regret to members

of this committee individually that Evart Grant Routzahn did not live to see the exhibits on medical science and public health at the New York World's Fair 1939, which were part of his planning and which tangibly express a scheme of educational method that he labored so devotedly to introduce into the American health education scene.

The committee wishes to express its deep sympathy to Mr. Routzahn's wife, Mary Swain Routzahn, and to other members of his family. His inspiration, his personality and his loyal service will abide in the future work of this committee, and in the memories and work of its members.

BOOKS AND REPORTS

A Fundamental Approach to Bacteriology—By *Courtland Sawin Mudge and Floyd Russell Smith*. San Francisco: J. W. Stacey, 1939. 265 pp. Price, \$2.50.

As the authors say in their preface, this book does not quite reach the dignity of a textbook but it is not the conventional laboratory manual. The dominant idea of the plan which the authors have adopted is to gain and maintain the interest of students by grounding them in basic principles which provide them with the reason for doing the work set before them. This does away with the drudgery of dry memorizing. They are taught to know why they are doing things instead of doing them by rote. The authors point out that much of the new work constantly going on does not get into textbooks for a long time, or not at all, and they have attempted successfully to avoid this fault of teaching.

The book is an excellent laboratory guide for general bacteriology. The material is well selected and well prepared in simple and interesting fashion. Much of the "newer work" not found in the ordinary textbook is included, such as physical phenomena, oxidation-reduction, statistical methods, etc. The arrangement of the book is good and it contains a number of excellent illustrations. It is written in rather unusual style calculated to hold the interest of the student.

The printing and make-up of the book are good and it has ring binding which has considerable advantage for laboratory work, since the book lies flat at any opening.

We wish that the authors had not indulged in the all too prevalent trend of having an introduction by someone not connected with the writing of the book. Such an introduction is of necessity an apology, though intended as a boost. "Good wine needs no bush."

This laboratory manual can be entirely recommended for the purpose for which it was designed.

MAZÏCK P. RAVENEL

Play and Mental Health, Principles and Practice for Teachers—By *John Eisle Davis*. New York: A. S. Barnes Co., 1938. 202 pp. Price, \$2.50.

So much has been written on play that is ephemeral, that it is a pleasure to review a book based upon scientific observation and practical experience. The author presents his material from the developmental, dynamic standpoint with special emphasis upon the mental hygiene value of properly conditioned play. In his words, "Play is this modifiable experience which in the hands of the child and the hygienically trained teacher possesses so many elements out of which to organize and project lessons vitally related to the child's most effective growth and wholesome development," play may be regarded either as a conflict or as co-operative competition. Both of these concepts are logically considered. "Modern educators emphasize coöperation as the effective keynote and the criterion of happy conduct particularly in play."

The chapters on "Play and Psychic Adjustment" and "Play and Adjust-

ment to the Outside World" are stimulating reading and are conducive to clearer thinking in the field of education. "The teacher should never forget that it is not activity alone but what activity means to the child that determines its value." The outcome of ideal play should be happy socialization of the child. Each chapter is followed by a well selected bibliography. The hygienic objectives in play education are succinctly stated at the end.

RICHARD A. BOLT

The Etiology of Trachoma—By *Louis A. Julianelle, Ph.D.* New York: Commonwealth Fund, 1938. 248 pp. Price, \$3.25.

For those attempting to follow the expanding area of the virus infections, this volume should prove of great interest.

It is the first extensive work dealing with the etiology of this world-wide disease since 1914. It is a not too detailed, judicial presentation of most of the research that has been done on trachoma. The major portion of the monograph is given to a consideration of the more recent studies made by the author and others which have resulted in the present concept that trachoma is probably a virus infection.

It goes even farther. It develops the interesting picture of the two virus diseases of the human conjunctiva, trachoma and inclusion-body blennorrhoea, which are probably closely related but it is only the latter which has been found, so far, naturally to infect the genitourinary passages of any animal.

The three main problems of the research worker in this field have been:

- (a) Finding a suitable experimental animal
- (b) Unsolved problems connected with the successful passage of the virus through a filter
- (c) Failure so far in culturing the virus on living tissue

Certainly, after reading this work

one must conclude that trachoma is a disease of the conjunctiva, transmitted by an infectious agent which passes a filter. Whether this infectious agent is the inclusion-body found in the epithelial cells of the conjunctiva in trachoma is not yet proved although Thygeson has certainly made a good case for it.

C. E. RICE

A Short Encyclopaedia for Nurses—By *Evelyn C. Pearce.* (3rd ed.) New York: Dutton, 1939. 686 pp. Price, \$3.50.

It has been a real pleasure to study this book which goes well as a companion piece to *A General Textbook of Nursing*, by the same author. Although not so stated on the title page, this is a 3rd edition, in which the author has taken advantage of the reviews made of the former ones. The greatest change appears to be that an index has been added, which the author believes will be a help to readers.

Not in the way of criticism, but as a question which has long dwelt in the mind of the reviewer, we may ask whether or not it is wise to make things too easy for students. Of course, the book is not intended to take the place of thorough study on the part of the nurse, but is an excellent reference book and refresher, both for students and teachers.

The printing and make-up are excellent. Written by an Englishwoman and printed in England, we find the English spelling of many words which have been shortened in our typical American haste. For the purpose for which it is designed it can be unreservedly recommended.

MAZÏCK P. RAVENEL

Public Health Administration in Maryland—By *Maryland State Planning Commission, Baltimore, Md.,* 1938. 153 pp. Price, \$1.00.

In these days of rapid development

of public health administration, this comprehensive review of the structure, functions, administration, and relationships of the state and county health organizations in Maryland is both constructive and timely.

The Chairman of the Commission, Abel Wolman, calls attention to guiding principles disclosed in the report which rest upon such basic considerations as the following:

1. Trained efficient personnel is indispensable (perhaps the most important factor) in the adequate functioning of any public health organization.
2. The formulation of a program with obtainable measurable objectives is a prerequisite to future action.
3. Since the effectiveness, development, and integration of the various elements in county government may aid or hinder the development of satisfactory health services, an effort must be made to coordinate and integrate all of the public activities in each county, so that the taxpayers may receive for each dollar expended, the maximum of public health and welfare.

Other factors emphasized are the importance of cooperation between official central and local units and unofficial agencies, utilization of interests of lay advisory groups, extension of health education, development of research facilities to a higher degree, and consolidation of all state health functions into one State Health Department.

The report is divided into four parts. Part I deals with administrative and technical services; Part II gives consideration to a special county government project in which such services as public health, education, social and economic welfare would be integrated as interrelated members of a unified county program under the leadership of a trained county coordinator; Part III comprises an administrative study of official and nonofficial health and welfare organizations; Part IV consists of a survey of Anne Arundel County, with special reference to public health, medical care, and social welfare.

The report is arranged in a somewhat novel manner, each major section containing a series of challenging questions coupled with comments on practical aspects of the problems studied, factual data, and suggestions for future planning. Coming from a jurisdiction in which the efficiency of the state health department has long been recognized, this study offers much solid food for any administrator of public health who is hungry for ideas. The report is likewise full of useful information and stimulating suggestions for the student of government.

IRA V. HISCOCK

Health at Fifty—Edited by William H. Robey. Cambridge: Harvard University Press, 1939. 299 pp. Price, \$3.00.

For 33 years the Harvard Medical School has sponsored a series of free Sunday afternoon lectures on medical subjects. The attendance has been large and there have been many demands for copies of the lectures. As a result, 12 of the most popular lectures given during the past 3 years have been selected and are now published in this volume. These are on subjects which are of interest to everyone and about which one section or the other of the public is constantly seeking information.

The editor very properly warns against misunderstanding the title of the book, since health at 50 years of age implies the best sort of care during childhood and adolescence. The title, however, is good. It is constantly being pointed out that the prolongation of life in America, about which we boast, is due to the saving of life during the first few years and that we have done little toward conservation after middle life. These lectures are devoted to that period of life.

The lectures are written for the laity in language that can be easily understood by anyone with ordinary educa-

tion. It is an extremely useful book, authentic in every detail, which deserves a place in every public library. The printing and make-up are excellent. There are no illustrations.

MAZÏCK P. RAVENEL

Pediatric Nursing—By *M. Corrinne Bancroft, Elizabeth Pierce and Bessie Cutler* (3rd ed., completely revised, reset, enlarged). New York: Macmillan, 1938. 652 pp. Price, \$3.00.

This new edition brings the material up to date and gives an excellent idea as to the functions of the nurse in her relations to children. Part I treats of normal growth and development and general hygienic care, including nutrition. One is impressed with the preventive aspects of pediatrics and with the consideration given to mental and emotional development.

Part II describes in systematic manner the general nursing procedures basic to effective nursing. The content is well organized, specific in details, and illustrates the important methods and devices.

Part III is devoted to nursing techniques in the diseases of infancy and childhood. It takes up in order the most important diseases of children and brings to bear upon them the most approved methods of treatment from the standpoint of modern pediatrics and pediatric nursing. Suggested references are given at the end of the chapters, and a list of play materials and books suitable for children at various age levels completes the volume. The format of the book is excellent and it is bound in attractive semi-flexible covers.

RICHARD A. BOLT

William B. Wherry—Bacteriologist—By *Martin Fischer*. Springfield, Ill.: Thomas, 1938. 294 pp. Price, \$4.00.

This biography, printed for private

distribution, represents a labor of love designed to perpetuate the memory of one who was a modest, kindly, Christian gentleman and a scientist of the purest integrity.

The life of the man is sketched by Professor Fischer from the cradle to the grave; the author evidently had access to private records for data which otherwise would not have been available.

The reviewer is concerned here only with the medical and scientific elements of Wherry's career; he came under the influence of Ludvig Hektoen, Theobald Smith, and Edwin O. Jordan early in his professional life, and naturally much was expected of the young man. The work of Wherry in the Philippines, in Montana, in California, in Cincinnati and elsewhere is all sketched in with suitable quotations from letters written to him or by him as well as with references to published material.

His discovery of plague infection among California ground squirrels is set forth at some length and given the importance it deserves. To complete the history it may be proper to add that Rupert Blue, who later became the Surgeon General of the U. S. Public Health Service, had long been convinced on epidemiological grounds that plague was present among the ground squirrels of California and that occasionally human infections came from that source. Fischer seems to criticize the lack of effective action that might have been taken upon the discovery of plague among ground squirrels; at first glance such an attitude seems justified, but subsequent developments leave one in doubt as to whether anything useful could have been accomplished in the way of suppressing what we currently speak of as "sylvatic plague"; experience has taught us a great deal during the intervening thirty years.

Wherry's discovery of the etiologic

nature of the human disease entity we now know as Tularaemia, and his addition of a new host (the rabbit)—perhaps the most important host from the point of view of clinical medicine—were clearly set forth.

Apparently, in spite of a meticulously careful technic, Wherry was not to escape the common fate of those who carry on investigations on *Bacterium tularensis* in the laboratory; he almost certainly acquired the infection.

Fischer does not bring out quite so clearly as might have been expected Wherry's attitude toward superficial scientific workers; the kindest designation he had for such was "pseudoscientists."

Wherry was constantly being distracted by offers of teaching and research positions but he never allowed himself to be guided by any consideration other than the possible opportunities for rendering greater service in the advance of medical science. Viewed superficially, many offers might seem to have been more promising than the one he elected to accept or retain, but always his sure insight guided him well in making his decisions.

We can share Fischer's admiration for Wherry and his achievements without necessarily accepting all of his published work as convincing; for example, we believe too much importance is attached to the work on the cultivation of the leprosy bacillus, and to the treatment of typhoid fever with a vaccine.

Wherry's more important fields of work are well known, but the book furnishes a complete bibliography. The sum total of his important research is very creditable and becomes even more so when one appreciates the physical handicap (cardiac) under which the man worked for at least the last 40 years of his life.

One who stood with Wherry by the bedside of patients suffering from

plague, cholera, or other tropical diseases, opposite him at the autopsy table in the San Lazaro Hospital in Manila, who worked by his side in the laboratory at San Francisco and later in the Hygienic Laboratory (now the National Institute of Health) at Washington, D. C., feels that Fischer has rendered a distinct service in making this biography available to the wide circle of Wherry's admirers and friends.

The volume is a notable example of the printer's art, a suitable vehicle for a memorial of such a man as the one whose life is told therein.

GEORGE W. MCCOY

Modern Sewage Disposal—Langdon Pearse, Editor. New York: Federation of Sewage Works Associations, 1938. 371 pp. Price, \$2.50 to Sewage Works Journal subscribers; \$3.50 to others.

The attempt to commemorate the tenth anniversary of the founding of the Federation of Sewage Works Associations by publishing a volume containing what might be a report of a convention of the association has resulted in an outstanding contribution to the science of sewage disposal and treatment. Under the experienced editorship of Langdon Pearse and Dr. F. W. Mohlman, both from the Sanitary District of Chicago, the book has attained the position of an authoritative compendium of much that has happened in sewage treatment during its entire development.

Beginning with an introduction by Prof. C. G. Hyde reviewing sewage treatment during the past fifty years in the United States, the volume is subsequently divided into four general sections.

"Sewage Treatment Practice" contains histories and descriptions of all the underlying principles of disposal, the various types of plants developed to utilize these principles and the

appurtenances added to perfect the operation of these plants.

"Sewage Research" describes the problems to be solved and the personnel, methods, and equipment for doing this. The bibliographies in this section are outstanding for their complete coverage of this subject.

Under "Regional and National Aspects," sewage disposal methods in Great Britain, England, South Africa, the Netherlands, and Germany are described.

In "Industrial Wastes" the effects of this waste on sewage treatment and the tremendous problems involved are presented.

Each of these four sections is divided into 31 topics which are discussed by the outstanding authorities of the world. This, together with the fact that each topic is carefully written, makes adverse criticism improbable. Many papers are completed with excellent bibliographies.

Not only will this volume serve as a reference for historical research in sanitary engineering, but it could, at the present time, serve admirably as a text on sewage disposal and as a disposal plant operator's manual.

F. J. MAIER

Research and Statistical Methodology: Books and Reviews, 1933-1938—Oscar Krisen Buross, Editor. New Brunswick, N. J.: Rutgers University Press, 1938. 100 pp. Price, \$1.25.

This publication is a compendium of reviews of statistical literature published from January 1, 1933, to November 15, 1938. Books are classified under three separate indices (a) professional field, (b) titles, and (c) authors and reviews.

Listed under "Medical and Vital Statistics" are books by Davenport and Ekas; Elderton; Fisher and Yates; Mainland; and Hill. Unfortunately during the period covered few books

on vital statistics have been written and the publications covered are not indicative of the texts currently in use. Publications such as Pearl's *Medical Biometry and Statistics* (1930), Newsholme's *Vital Statistics* (1924) deserve mention. These might well have been included in a supplementary list with back publications for other fields.

The work fills a definite need as a guide to recent statistical literature and should prove of particular interest to statisticians and educators.

LOUIS FELDMAN

Sir Thomas Roddick—By H. E. MacDermot, M.D. Toronto: Macmillan Company of Canada, 1938. 160 pp. Price, \$2.00.

Sir Thomas Roddick is, without question, one of the outstanding figures in the medical life of Canada. Born in 1846, in Newfoundland, he secured his early education in that country and, later on, in Nova Scotia. He came to McGill University for his medical studies and was graduated in 1868.

His biography, as presented by Dr. H. E. MacDermot, a recognized medical historian, is divided into three sections. The first covers the introduction of antiseptic surgery, in which Roddick played a leading rôle. The second deals with his military career as Chief of Medical Staff in the Field during the Riel Rebellion in 1885. The third section describes Roddick's part in the securing of "The Canada Medical Act," which achieved certain national uniformity in medical licensure without interfering with provincial rights.

Dr. MacDermot has told this story of Canadian Medicine in a simple, readable, and entertaining manner. While Roddick naturally dominates the theme, around his figure are pictured the important happenings of his day, not only medical, but political and social as well. Of particular value are the recorded comments of those who

were younger contemporaries of Roddick and who are still active members of society.

The book will have an appeal for public health workers as Roddick taught Hygiene in the Faculty of

Medicine at McGill University. They will be interested too in the recital of the application of Lister's methods in surgery, and of the various problems in hygiene which Roddick faced in the Riel Rebellion. GRANT FLEMING

BOOKS RECEIVED

A POCKET MEDICAL DICTIONARY. Compiled by Lois Oakes and assisted by Thomas B. Davie. (3rd ed.) Philadelphia: Reilly, 1938. 397 pp. Price, \$1.00.

BACKGROUND TO MODERN SCIENCE. Ten Lectures at Cambridge Arranged by the History of Science Committee. Edited by Joseph Needham and Walter Pagel. New York: Macmillan, 1938. 243 pp. Price, \$2.00.

MANUAL OF TOXICOLOGY. By Forrest R. Davison. New York: Hoeber, 1939. 241 pp. Price, \$2.50.

THE ANAEROBIC BACTERIA AND THEIR ACTIVITIES IN NATURE AND DISEASES, A SUBJECT BIBLIOGRAPHY. By Elizabeth McCoy and L. S. McClung. Berkeley: California Press, 1939. 2 Vols. \$10.00.

MEDICAL ENTOMOLOGY, WITH SPECIAL REFERENCE TO THE HEALTH AND WELL-BEING OF MAN AND ANIMALS. By William B. Herms. Second edition of Medical and Veterinary Entomology. New York: Macmillan, 1939. 582 pp. Price, \$5.50.

COMMUNITY HEALTH ORGANIZATION. Edited by Ira V. Hiscock. (3d ed.) New York: Commonwealth, 1939. 318 pp. Price, \$2.50.

YOU'RE THE DOCTOR. By Victor Heiser. New York: Norton, 1939. 300 pp. Price, \$2.50.

A GIRL GROWS UP. By Ruth Fedder. New York: McGraw-Hill, 1939. 235 pp. Price, \$1.75.

GETTING READY TO BE A FATHER. By Hazel Corbin. New York: Macmillan, 1939. 48 pp. Price, \$1.25.

TEXTBOOK OF HEALTHFUL LIVING. By Harold S. Diehl. (2d ed.) New York: McGraw-Hill, 1939. 634 pp. Price, \$2.50.

IT'S MORE FUN TO BE THIN. By Jean Z. Owen. Boston: Marshall Jones, 1939. 181 pp. Price, \$2.00.

PRINCIPLES OF MEDICAL STATISTICS. By A. Bradford Hill. (2d ed.) London: *Lancet*, 1939. 189 pp. Price, \$2.25.

PROCEEDINGS OF A CONFERENCE ON THE EDUCATIONAL PRODUCTION OF MOTION PICTURES. The Ohio State University, November 22-23, 1938. Columbus: Bureau of Educational Research, Ohio State University, 1939. 120 pp.

APPARATUS FOR ELECTROLYTIC CONDUCTIVITY MEASUREMENTS IN LABORATORY AND PLANT. Catalog EN-95, 1939. Philadelphia: Leeds & Northrup Co., 1939.

BUDGE ON TENNIS. By J. Donald Budge. New York: Prentice-Hall, 1939. 180 pp. Price, \$2.00.

GANDHI TRIUMPHANT. The Inside Story of the Historic Fast. By Haridas T. Muzumdar. New York: Universal Publishing Co., 1939. 103 pp. Price, \$1.00.

TOWARD A HEALTHY AMERICA. By Paul de Kruif. New York: Public Affairs Committee, 1939. 32 pp. Price, \$1.00.

A DOCTOR FOR THE PEOPLE. By Michael A. Shadid. New York: Vanguard, 1939. 277 pp. Price, \$2.50.

FACTS ABOUT CURRENT ENGLISH USAGE. By Albert H. Marckwardt and Fred Walcott. New York: Appleton, 1938. 144 pp. Price, \$0.90.

WHAT IT MEANS TO BE A DOCTOR. By Dwight Anderson. New York: Public Relations Bureau, 1939. 87 pp. Price, \$1.00.

TUBERCULOSIS SANATORIUM PLANNING. New York: National Tuberculosis Association, 1939. 46 pp. Price, \$0.50.

HANDBOOK ON TUBERCULOSIS FOR PUBLIC HEALTH NURSES. By Violet H. Hodgson. New York: National Tuberculosis Association, 1939. 92 pp. Price, \$0.50.

THE TREATMENT OF TUBERCULOSIS IN GENERAL HOSPITALS. New York: National Tuberculosis Association, 1939. 14 pp. Apply.

SPORTS FOR THE HANDICAPPED. By George T. Stafford. New York: Prentice-Hall, 1939. 302 pp. Price, \$2.50.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Causes of Improvement Analyzed—For a 20 year period ending in 1931, there was no demonstrable downward trend in Cleveland's high puerperal mortality rate. Since then the rate has gone from over seven to about three. That the decline in other cities should be similarly studied and analyzed all will agree.

BOLT, R. A. Reduction of Maternal Mortality in Cleveland. J.A.M.A. 112, 16:1543 (Apr. 22), 1939.

Immunity to Tuberculosis—Wishful thinking that childhood infection with tuberculosis immunizes against later breakdowns from reinfection finds no support in this follow-up study of children tested with tuberculin. The ratio of later deaths among reactors and among negatives is 38 to 1.

CH'U, P. T. Y., *et al.* The Fate of Children with Primary Tuberculosis. J.A.M.A. 112, 14:1306 (Apr. 8), 1939.

Responsibility for Milk Safeguards—Every state health department should employ at least one sanitary engineer full time on milk supervision. No pasteurization plant should be constructed and no equipment installed or modified without the approval of the milk sanitation engineer. This official should have adequate training, which many have not had. The reasons for the eminently sound proposals are set forth in convincing array.

FRANK, L. C. Engineering Problems in Milk Sanitation. Pub. Health Rep. 54, 13: 513 (Mar. 31), 1939.

Blonds, TB, and Vitamin A—More than half the tuberculous persons tested gave evidence of vitamin A deficiency, and the extent of this de-

ficiency paralleled the severity of the tuberculosis infection. Observations of "normal" blonds and brunettes are also recorded.

GETZ, H. R., *et al.* Vitamin A Deficiency in Normal and Tuberculous Persons. J.A.M.A. 112, 14:1308 (Apr. 8), 1939.

Is This New to America?—A diphtheria scratch test similar to the von Pirquet was found specific for the disease. It has the advantages of simpler technic, requiring no syringe, is less time consuming, and slightly more sensitive.

GROZIN, M. Diphtheria Scratch Test. Am. J. Dis. Child. 57, 3:564 (Mar.), 1939.

Another Reason for Goiter Prophylaxis—Statistical evidence is presented which again suggests a relation between goiter and cancer. Therefore iodine prophylaxis, together with desiccated thyroid for the aged, may be a precaution worth taking from the standpoint of cancer also.

McCLENDON, J. F. The Statistical Relation Between Goitre and Cancer. Am. J. Cancer. 35, 4:554 (Apr.), 1939.

Basis of Sanitation—Varying degrees of participation by federal, state, and local health agencies in the sanitary engineering program are discussed and the conclusion is reached that though expansion in many state divisions is needed, the great weakness is in local units.

McLAUGHLIN, A. J. A Basic Program of Sanitation. Health Officer. 3, 12:411 (Apr.), 1939.

Confession Still Good for the Soul—It is difficult to believe, write these authors, that, for all our success in early diagnosis, improved facilities for

treatment, and progressive education, the death rates can be so high (among high school students with tuberculosis), that our case control can be so poor, and that deaths are greater among incipient than among advanced cases.

NOVAK, J. B., and KRUGLICK, J. S. End Result of a Tuberculosis Case-Finding Project. *J.A.M.A.* 112, 5:1452 (Apr. 15), 1939.

Modern Health Crusade—Words of wisdom about health education, ending with this: if we really believed in the importance and value of health education, much more of it would be carried out! While lip service to prevention is common, every official knows how much harder it is to carry through a preventive scheme than to secure support for remedial work.

SAVAGE, W. The Media and Organization of Health Education. *J. Roy. San. Inst.* 2, 4:256 (Apr.), 1939.

Fertile Health Exhibit Ideas—Some of the newer technics found useful at the New York Museum of Science and Industry are these: spotlighted demonstrations; scientific side-shows to high-spot features and give variety; tie-up of scientific exhibit with appropriate subjects running in the commercial movie houses; luring various groups by movie "screen tests" of golf stroke, or demonstration of some special scientific technic. This limited list should convince you of the value of this paper, but there is a lot more.

SHAW, R. P. New Developments in Scientific Museum Techniques and Procedures. *Sci. Month.* 48, 5:443 (May), 1939.

Well-Fed Mothers-to-Be—Optimal diet for pregnancy should include fruit, eggs (3), milk (1 qt.), meat, vegetables, butter (with other foods added to give sufficient calories), at least 3 grains of ferrous sulphate and 800 units of vitamin D. The requirement of food factors for optimal nutrition are set forth in a useful table, and there is much

more of interest to maternal hygienists.

STRAUSS, M. B. Nutritional Requirements and Deficiencies in Pregnancy. *J. Am. Dietet. A.* 15, 4:231 (Apr.), 1939.

Scarlet Fever Immunization and Rash—Active immunization with scarlatinal streptococcus toxin which changed the positive Dick test to negative had no demonstrable effect upon certain immunological properties of the blood toward streptococci. The author does not comment on these findings in a study to determine the expected benefits from immunization against scarlet fever, but one may arrive at some assumptions of his own by reading the whole paper.

STRUMIA, M. M. Immunologic Studies in Active Vaccination Against Scarlet Fever. *J. Immunol.* 36, 4:301 (Apr.), 1939.

Do Second Attacks of Polio Occur?—Experiments are reported upon monkeys recovered from poliomyelitis and reinfected with material from acute measles cases. New paralysis developing without the typical inflammatory changes of polio suggests that supposedly second attacks of the latter disease in humans may be due to some other infection.

TOOMEY, J. A., and WEAVER, H. M. Experimental Paralysis in Monkeys Completely Recovered from Poliomyelitis. *Am. J. Dis. Child.* 57, 3:541 (Mar.), 1939.

We Have Enough Bugs of Our Own—Listed are the 650 assorted insects: mosquitoes, flies, beetles, wasps, ants, moths, cock roaches, and chinch bugs, brought into the U. S. on airplanes from South and Central American ports.

WELCH, E. V. Insects Found on Aircraft at Miami, Florida, in 1938. *Pub. Health Rep.* 54, 14:561 (Apr. 7), 1939.

Brains, Courage, Money, Patience Needed—Striking and useful are these statistics: half of the venereal infections are acquired innocently: half the

syphilis infections are acquired in the 20 to 30 year age group: the sex ratio is 3 men to each 2 women. One in every 12 pregnant women (in 15 city clinics) had syphilis. It costs the country 50 million dollars each year to keep the paretics in the comfort to which they are accustomed!

WILBUR, R. L. Social Hygiene—A Task of All the People. *J. Social Hyg.* 25, 3:113 (Mar.), 1939.

Reference Item—The work of each of the divisions of the Canadian National Health Section is described. The organization is much like that of the U. S. Public Health Service, it would seem.

WODEHOUSE, R. E., *et al.* The Health Section of the Department of Pensions and National Health, Canada. *Canad. Pub. Health J.* 30, 3:119 (Mar.), 1939.

How Much Maternal Care?—Every patient should be examined at the end of the lying-in period, from 10 to 14 days after delivery. In normal cases a second examination should be made at the clinic 6 weeks after delivery. What should be done at each is set forth by this British authority. These suggestions would improve some post-natal practice hereabouts.

WOOD, J. L. M. The Scope of the Post-Natal Examination. *Pub. Health.* 52, 7:197 (Apr.), 1937.

ASSOCIATION NEWS

A STATEMENT OF THE POSITION OF THE AMERICAN PUBLIC HEALTH ASSOCIATION WITH REFERENCE TO THE NATIONAL HEALTH BILL OF 1939 (S. 1620)

as made by Abel Wolman, Dr.Eng., President of the Association, before the
Senate Committee on Education and Labor, May 4, 1939

THE American Public Health Association has approved in principle the major aspects of the National Health Program and has directed a committee to lend the assistance of this professional society of public health workers in order that these principles may be translated into effective action.

The National Health Bill of 1939 has been studiously compared in detail with the principles declared by the Association as desirable or requisite for such a document. We conclude that, with but one major exception, this effort to implement the National Health Program meets the conditions published by the Association.

The Association approves the evidences of effective interest of the federal government in the health of the nation.

We accept the proofs presented again and again that large areas of our country do not have the benefits of adequate health service.

We believe that state health departments and local health agencies are necessary to provide indispensable services.

We specifically endorse the recommendations of the Technical Committee on Medical Care as they provide for (1) expansion of public health services including maternity and infancy, (2) expansion of hospital facilities both general and special, (3) provision of essential medical, hospital, and nursing care as required to persons unable to support such care from their own re-

sources, (4) compensation against wage loss through sickness.

We are gratified to find these four recommendations all embodied in the Wagner Bill.

We believe that wide latitude should be allowed the states in the definition of the population to be served and the method of providing medical services. Here again we note that the Wagner Bill agrees.

We believe that these benefits should be provided for the whole population, and are pleased to note that the National Health Act of 1939 specifies that a plan to provide state-wide coverage at once or in not more than 6 years must be submitted in order for a state to qualify for federal aid.

We further believe that the primary federal function in this field is to give financial and technical aid to states for approved programs. We note that the Wagner Bill does not depart from this primary function.

We believe that it is desirable that a single state agency, the health department, should be administratively responsible for all the provisions of the National Health Program. We note that the Wagner Bill agrees in general, except on the administrative responsibility of the disability compensation provisions.

We believe that the state health department can provide better personnel and maintain higher standards for these services than any other state

agency. We find no apparent disagreement with this position in the Bill.

We believe that qualified advice will be requisite from several professional groups concerned. We note that it is provided for in the Bill, though in a somewhat cumbersome fashion.

We believe that increased funds for training purposes will be essential, and we note that these are provided in the Bill.

We believe that the program should be developed around and based upon existing preventive health services, and we find provisions to this effect in the Act.

We believe that wide latitude must be given to the states in defining not only the population to be served and in the selection of the method of providing medical service but also in the method of raising funds in the states. We believe this latitude is embodied in the Wagner Act.

We believe that the fundamental objectives of this program are, first, the conservation of health and vitality and, second, the reduction of the rôle of sickness as a cause of poverty and dependency. We find no disagreement with these objectives in the Wagner Act.

We believe that the expansion of public health and maternal and child health services, the expansion of hospital, clinic, and other institutional facilities, and the provision of medical care for the medically needy should have priority in initiation. We assume that under the Bill as proposed the states are left with discretion sufficient to choose the items to be developed and the order in which they will be begun.

We believe that the existing provisions for state aid under the Social Security Act constitute a good framework for expansion, and we note that the Wagner Act is an amendment and an expansion of the Social Security Act.

We believe that state programs in order to be approved must provide for

the maintenance of high personnel standards, and we believe that federal aid should be withheld on substandard services. The concurrence of the National Health Bill is noted with approval.

We believe that federal authorities should have power to establish minimum standards after consultation with competent advisory bodies. Again we note agreement of the Wagner Act.

We believe that federal aid should be conditioned on the inclusion in the state plans of adequate safeguards for standards in general, and this we find included in the Wagner Act.

We believe that the extension and improvement of public health services requires the integration of health services at the federal level under one cabinet officer, preferably a Secretary of Health.

We note here a major divergence in the draft of the National Health Act of 1939 which makes the Children's Bureau responsible for maternal, infant, child hygiene, and crippled children's services, whereas the U. S. Public Health Service is to be responsible for general public health work, for investigation, and for hospitals and health centers, and the Social Security Board is to be responsible for the medical care features and for disability compensation.

In this connection we have noted with interest that the recent reorganization order transfers the U. S. Public Health Service and the Social Security Board to a new independent agency without Cabinet representation. No clear provisions for coördination are made. This may therefore be consolidation without coördination, particularly since the Children's Bureau is left in the Department of Labor and various other federal agencies such as the medical service of the Indian Service are left where they are.

It is therefore apparent that the Wagner Act meets the recommendations

of the American Public Health Association in practically all respects excepting the failure to make a single federal agency responsible for all features of the Act. In this respect the National Health Act of 1939 even further complicates the federal administration of health services by imposing upon the Social Security Board a new responsibility for which it now has neither staff nor experience.

It is further noted that although advisory councils are requisite both at the federal and state level, the provisions as made by Sections 503, 513, 603, 1203, 1206, and 1303 will require a total of about 262 separate councils. We believe that these are too numerous

and unwieldy. It would perhaps suffice to provide for one council to each federal agency responsible under this Act and for one council to each state agency chosen for state responsibilities. This would reduce the number probably to less than one hundred. Nevertheless, the membership, the duties and the responsibilities of these councils are still vague. We believe that these details of advisory councils, their number and their duties and responsibilities are matters that can well be cleared in conference.

With the above exceptions we believe that the National Health Act of 1939 can be approved as a device to implement the National Health Program.

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

Samuel D. Allison, M.D., 2706 N.E. Clickitat St., Portland, Ore., Director, Division of Venereal Disease Control, Oregon State Board of Health
Helen Baldwin, M.D., Canterbury, Conn., Public Health Officer
Edward B. Bukowski, M.D., C.P.H., 806 Fillmore Ave., Buffalo, N. Y., Assistant Director, Syphilis Control Program, City Health Dept.
Jack A. Crittenden, M.D., Elba, Ala., Health Officer, Coffee County Health Dept.
Samuel S. Farago, M.D., Ph.B., 101 West Broad St., Westerly, R. I., Health Officer
William Y. Garrett, M.D., Eastville, Va., Health Officer, Northampton County Health Dept.
Theodore A. Jost, M.D., City Hall, Mount Vernon, N. Y., Commissioner of Public Health
William L. Lockman, M.D., Julian, Calif., Physician, U. S. Indian Service
L. Archibald MacLean, M.D., Box 180, Red Deer, Alberta, Sask., Canada, Medical Health Officer
Cornelius M. Mills, M.D., C.P.H., 303 State Bldg., San Francisco, Calif., Chief, Crippled

Children's Services, State Dept. of Public Health
Emil E. Palmquist, M.D., 543 East 91 St., Seattle, Wash., Health Officer
Harold H. Whitted, M.D., State Dept. of Public Health, Montgomery, Ala., Acting Assistant Surgeon, Division of Venereal Diseases, U. S. Public Health Service

Laboratory Section

Gladys Anthony, A.B., Box 217, Grand Junction, Colo., Owner and Director, Anthony Clinical Laboratory
Harold E. Brakewood, A.B., National Folding Box Co., New Haven, Conn., Chief Chemist
Elmer F. Chaffee, 1317 Alturas St., Boise, Idaho, Laboratory Technician, Idaho Division of Public Health
William A. Dunlap, M.A., District Laboratory 1, State Board of Health, Parsons, Kans., Bacteriologist in Charge
Jules Freund, M.D., C.P.H., Bureau of Laboratories, New York City Dept. of Health, Otisville, N. Y., Assistant Director
Arthur W. Hayes, Route 1, Box 5753, Sacramento, Calif. Market Milk Specialist, California State Dept. of Agriculture

Maxwell L. Littman, Ph.D., 108 Goodwin Ave., Newark, N. J., Sanitary Chemist and Bacteriologist. Dept. of Water Supplies and Sewage Disposals, New Jersey Agricultural Experiment Station

Mary H. Rankin, B.A., 501 Texas Ave., Austin, Tex., Laboratory Technician, Texas Bureau of Laboratories

Mary E. Tenney, M.A., 1208 South 8 St., Sheboygan, Wis., Supervisor, State Co-operative Laboratory of Hygiene

John L. Wilson, Ph.D., 914 Guardian Bldg., St. Paul, Minn., Research Director, Economics Laboratory, Inc.

Vital Statistics Section

Henry K. Beye, A.B., 2211 Quincy St., Bakersfield, Calif., Statistician, Kern County Dept. of Health

Margaret E. Graff, A.B., 82 Washington Ave., Albany, N. Y., Assistant Statistician, New York State Dept. of Health

Jules V. Quint, B.S., 1 Madison Ave., New York, N. Y., Assistant to Supervisor of Occupation Ratings and Accident Statistics, Metropolitan Life Insurance Co.

Public Health Engineering Section

Charles S. Brown, P. O. Box 684, Chapel Hill, N. C., Trainee Sanitarian, Georgia Dept. of Public Health

Louis H. Herschler, B. of C.E., Plague Laboratory, Kahului, Maui, T. H., Sanitary Engineer

Walter C. Janson, A.B., M.S.P.H., 294 N. Village Ave., Rockville Centre, L. I., N. Y., Student

Clarence R. Jones, B.S.Agr., C.P.H., Harrison County Health Dept., Clarksburg, W. Va., District Milk Inspector

Carl E. Schwob, M.S., 1800 West Fillmore St., Chicago, Ill., Senior Assistant Sanitary Engineer, State Dept. of Public Health

Percy A. Shaw, B.S., in C.E., Manchester Water Works, Manchester, N. H., Engineer Member, State Board of Health

Rodney L. Small, County Health Unit, Lewiston, Idaho, Sanitarian, Idaho North Central Health Unit

Industrial Hygiene Section

Harold W. Ruf, Ph.D., State Office Bldg., Madison, Wis., Industrial Sanitary Engineer, Industrial Hygiene Unit, State Dept. of Health

Food and Nutrition Section

Howard J. Cannon, A.B., 1411 East 60 St., Chicago, Ill., Director, Laboratory of Vitamin Technology

Louis S. Fridericia, M.D., Blegdamsvej 21,

Copenhagen, Denmark, Professor of Public Health, University of Copenhagen

Jean M. Stewart, M.A., Agricultural Extension Service, University of Arizona, Tucson, Ariz., Extension Nutritionist

Child Hygiene Section

Harry L. Clark, M.D., 353 Ocean Ave., Brooklyn, N. Y., Obstetrician and Gynecologist

Alexander A. Cozzalio, D.D.S., 318 First National Bank Bldg., Reno, Nev.

Harry S. Mackler, M.D., 590 West End Ave., New York, N. Y., Pediatrician, Foster Home Bureau, Hebrew Sheltering Guardian Society

Public Health Education Section

Dwight M. Bissell, M.D., C.P.H., Monterey County Hospital, Salinas, Calif., Health Officer and Assistant Medical Director

Mrs. Almeda Chandler, 5 Town Square, Plymouth, Mass., Clerk, Board of Health

Donald K. Freedman, M.D., 522 East 88 St., New York, N. Y., Associated Hospital Service of New York

Wilfred F. Kruse, M.S., 1028 Bonnie Brae, River Forest, Ill., Instructor in Public Health, Concordia Teachers College

Public Health Education Section

Ethel Mealey, M.S., State Board of Health, Portland, Ore., Director of Health Education

Mrs. Geneva F. Rockford, R.N., Memorial Hall, Northampton, Mass., Field Nurse and Executive Secretary, Hampshire County Public Health Assn.

Gerald A. Spencer, M.D., D.P.H., 2135 Seventh Ave., New York, N. Y.

Martha Van Meter, M.A., 583 Broadway, Gary, Ind., Executive Secretary of Lake County Tuberculosis Assn.

Public Health Nursing Section

Alma A. Carlson, Mountain Village, Alaska, Field Nurse, U. S. Office of Indian Affairs

Edith J. Dautremont, R.N., Taholah Indian Agency, Hoquiam, Wash., Field Nurse

Helen F. Dunn, B.S., 1812 K Street, N.W., Washington, D. C., Assistant Director of Nursing, American Red Cross

Nan M. Gallagher, R.N., Kakanak, Alaska, Field Nurse, U. S. Office of Indian Affairs

Margaret C. Joyce, R.N., 85 North Broadway, White Plains, N. Y., Field Secretary, Westchester Tuberculosis and Health Assn.

Mrs. Hope Newell, R.N., 110 West 94 St., New York, N. Y., Maternity Supervisor, Henry Street Visiting Nurse Service

Lillian I. Peterson, R.N., 1419 Schilling St., Chicago Heights, Ill., Public Health Nurse,

Tuberculosis Institute of Chicago and Cook
County

Mary A. Reber, R.N., C.P.H., 266 Blue Lakes
North, Twin Falls, Idaho, Staff Nurse,
South Central District Health Unit
Harriet C. Russell, R.N., Jerome, Idaho, Staff
Nurse, South Central District Health Unit
Eva G. Schwitzer, R.N., 723 Main East, Twin
Falls, Idaho, Staff Nurse, South Central
District Health Unit

Unaffiliated

John Campbell, Board of Health, Hilo,
Hawaii, Junior Sanitary Inspector
Arthur E. O'Neill, D.D.S., P. O. Box 103,
Redwood City, Calif., Chairman, Board of
Health and Welfare, San Mateo County
Max. A. Pleasure, D.D.S., 6250 Saunders St.,
Rego Park, L. I., N. Y., Dentist, New York
City Dept. of Health

DECEASED MEMBERS

Robert L. Frisbie, M.D., Rhinclander, Wis.,
Elected Member 1937
Clarence D. Hart, M.D., Savannah, Ga.,
Elected Fellow 1923, Elected Member 1918
Jacob G. Lipman, Ph.D., New Brunswick,
N. J., Elected Member 1915, Elected Fellow
1923
Gustave A. Ootman, M.D., Kelowna, B. C.,
Canada, Elected Member 1935
William H. Park, M.D., New York, N. Y.,
Elected Member 1912, Elected Fellow 1923
Evert G. Routzahn, New York, N. Y.,
Elected Member 1912, Elected Fellow 1923
Charlotte A. Stickney, M.D., St. Paul, Minn.,
Elected Member 1938
Grace Van Doorn, B.A., Milwaukee, Wis.,
Elected Member 1926

A.P.H.A. WORLD'S FAIR EXHIBIT

ADDITIONAL contributors to the exhibit on
Public Health Administration which the
Association is sponsoring at the New York
World's Fair are as follows:

Dr. Marion Shepard
Dr. Garland L. Weidner
Susan M. Wood

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge.

Replies to these advertisements, when keyed, should be addressed to the American Public Health Association, 50 West 50th Street, New York, N. Y., identifying clearly the key number on the envelope.

POSITIONS WANTED

HEALTH OFFICERS

Unusually well qualified and experienced administrator, M.D., Johns Hopkins; M.P.H., Harvard; with broad experience in administering programs of medical care, is available. A404

Physician, M.D., class A medical school; M.S.P.H., University of Michigan, 1939; 10 years' experience in administrative full-time health programs; seeks position in public health administrative position. A373

Physician, M.D., University of Cincinnati; with postgraduate training in venereal disease control, Johns Hopkins; is available as venereal disease control officer. A363

Physician with M.P.H. from Harvard, experienced as epidemiologist and in health administration, also in communicable diseases at state level, seeks responsible position. A392

Physician, M.D., class A medical school; 12 years' full-time public health experience; now employed with state department of health; will consider opening with well organized city or state department in communicable disease division or epidemiology or both. Mid-west preferred. A409

Physician, M.D., Yale; M.S.P.H., Columbia; also short course for health officers, Vanderbilt; good clinical background; one year public health experience; will consider appointment in child health, epidemiology or public health administration. A350

Physician, M.D., Syracuse University; postgraduate studies in bacteriology and immunology, will consider position as health officer or epidemiologist. Has served as director of county health unit, director of industrial hygiene and medical statistics and venereal disease field survey officer. A305

Physician, aged 39; M.D. and Dr.P.H., Yale University; with excellent training in medicine, pediatrics and epidemiology,

now specializing in public health education, will consider appointment in health education or administration. A366

Physician, M.D., Columbia; experienced as county health officer and superintendent of health, seeks position in public health administration or medical executive work. A396

Physician, M.D., Johns Hopkins; M.S.P.H., University of Michigan; experienced in school and city health work; for the past year director of county health department, seeks position as health director of city school system or in health service of a college or university. Will also consider position as epidemiologist or health officer in urban health department. A354

Physician, M.P.H., Harvard, well experienced in city and rural health administration, will consider appointment as district health officer or in city or state health department. A418

HEALTH EDUCATION

Young woman, Ph.D., Columbia University, splendid background of experience in health education, will consider position as director of public health education. H294

Well qualified woman in health education wishes position as health coordinator or health counselor. Has wide experience, and Ph.D. from New York University. H236

Young woman, M.A., Health Education, Teachers College, Columbia University; with splendid international experience, seeks position as director of health education. H369

Young woman, experienced teacher in health education, with M.S. in Public Health and Hygiene from University of Michigan, seeks position as health coordinator. H398

Experienced director of health education, R.N. and college graduate, with excellent references, will consider health education or promotional position. H408

LABORATORY

Experienced laboratory director with background of dairy products manufacture and research in control methods; University of Wisconsin, M.S. and Ph.D., desires administrative position with food manufacturing or processing industry, or association with health department doing routine and research work in food control. L381

Experienced woman bacteriologist, Ph.D., University of Illinois, 1937, wishes position in teaching or research. Excellent bibliography and references. L410

Physician, M.D., Northwestern; Dr.P.H., Johns Hopkins; broad experience in laboratory, teaching and epidemiological fields, will consider temporary position for summer, preferably in parasitology. M293

Capable research worker, Ph.D., trained at University of Southern California and Pasteur Institute, seeks position directing laboratory, in research work or field investigation. Has taught bacteriology, directed state hygiene laboratory and hospital laboratories. L315

Chemist and bacteriologist experienced in water supply, sewage, and public health laboratory work. Five years' ex-

perience. B.S., 1933. Desires work in sanitation or general public health. L412

Bacteriologist and serologist, A.B., University of Wisconsin, at present bacteriologist in state public health laboratory, will consider another position. L416

MISCELLANEOUS

Dentist, graduate of Temple University, with excellent postgraduate experience, desires position in administrative aspects of dental hygiene. M352

Physician, M.D., class A medical school; training in obstetrics and public health. Experienced as director of county health department, teacher of clinical obstetrics and administrator of state maternal and child health program, desires position in public health obstetrics or in maternal and child health administration. C417

Public health engineer, B.S. in Sanitary Engineering, University of California, 1937. Now completing training for C.P.H. in Public Health Engineering, University of California. Well trained in sanitation and other activities, including public health administration, health education, etc. Desires position as sanitary or public health engineer in municipal, county or state health department. E413

Positions Available

SCHOOL NURSE—Public health nurse with degree for interesting position with public schools in town of 65,000; midwest. PH-60, Medical Bureau, Pittsfield Building, Chicago.

CAMP NURSE—Boys' camp; Wisconsin; July and August; preferably school nurse who can take position each summer. PH-61, Medical Bureau, Pittsfield Building, Chicago.

PUBLIC HEALTH NURSE—City health department; preferably someone with some orthopedic training; considerable traveling. PH-62, Medical Bureau, Pittsfield Building, Chicago.

PUBLIC HEALTH NURSE—For position of assistant supervisor of nurses, city health department; graduate of scholastic work in public health and field work required; department carries on generalized public health nursing service; midwest; 4 month course in public health nursing and year of public health nursing under supervision re-

quired. PH-63, Medical Bureau, Pittsfield Building, Chicago.

SCHOOL NURSE—School system of small Colorado town; experience essential; \$1,200-\$1,500. PH-64, Medical Bureau, Pittsfield Building, Chicago.

ASSISTANT HEALTH COMMISSIONER—Physician, 35-40, with C.P.H. or M.P.H. and several years' experience; important southern city; vicinity \$5,000. PH-65, Medical Bureau, Pittsfield Building, Chicago.

STUDENT HEALTH PHYSICIAN—Unusual opportunity for young physician desiring to develop along lines public health work, health teaching; possibility attaining M.P.H. at termination of service; 8 hour day, month's vacation; \$2,000, increasing annually; university health service. PH-66, Medical Bureau, Pittsfield Building, Chicago.

Positions Wanted

PUBLIC HEALTH NURSE—B.S. degree; graduate of one of country's leading training schools; postgraduate training in public health and hygiene, state university; for further details, please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

BACTERIOLOGIST desires position, preferably in public health laboratories; B.A., eastern school; C.P.H. and Ph.D. (bacteriology), Yale University; has done considerable research; 4 years, bacteriologist and research technician, public health laboratories; for further details, please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

HEALTH EDUCATOR—Graduate nurse and B.S. degrees; social service certificate; 3 years' experience in social service; 4 years' industrial nursing; 10 years, director of a health council; for further details, please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

PUBLIC HEALTH PHYSICIAN desires connection; M.D., Virginia; several years' successful private practice; 10 years' public health work during which time he has been promoted continuously, excellent reason for relocating; for further details please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

NEWS FROM THE FIELD

WHITE HOUSE CONFERENCE ON CHILDREN IN A DEMOCRACY

THE President of the United States has appointed the Honorable Frances Perkins, Secretary of Labor, as Chairman of a White House Conference on Children in a Democracy. Following preliminary work by an informal committee and conference with the President, a Planning Committee was appointed by the Chairman of the Conference to be responsible for its organization and work. This Planning Committee met in Washington on March 14 and planned a meeting on April 26 at the White House for the general organization of the Conference.

In order to provide for a wide representation of professional and lay interests and to secure representation from each state, a committee has been selected of about five hundred with the aim that this might be a working conference.

The first meeting was held in Washington on April 26 at the White House. The speakers included the President of the United States, Mrs. Franklin D. Roosevelt, The Honorable Frances Perkins, Secretary of Labor, Right Rev. Mng. Robert F. Keegan of New York, the Executive Director of the Catholic Charities of the Archdiocese of New York, and Homer Folks of New York, Secretary of the State Charities Aid Association.

This Conference, which is the fourth White House Conference on this general subject, will hold its final sessions early in 1940—ten years after the last similar Conference.

Katharine F. Lenroot, Executive Secretary of the Conference, has announced that the total membership is now 585, including representatives of every state and of Alaska, Hawaii, Puerto Rico, and the District of

Columbia. Attendance at the initial sessions included 410 persons, representing all but two states and Alaska.

Among subjects to be considered by the Conference will be the following:

1. Children and Democracy

A consideration of the primary objectives of a democratic society in relation to children, the institutions through which a democratic society works for the attainment of these objectives, and the ways in which democracy, through its various institutions, can present to children and youth an intelligent understanding of its goals and ideals.

2. Children and Life in the United States Today

A consideration of the needs of children under present-day conditions in the United States, the extent to which they are met, and the ways in which they may be supplied more fully.

3. Children and the Future of America

A summary of the major issues developed under the previous headings, with recommendations which may lead to more complete realization of the objectives of democracy for children and the development in children of capacities for democratic living.

Among those in attendance at the first session were more than 60 Fellows and members of the American Public Health Association.

PUBLIC HEALTH ASSOCIATION OF NEW YORK CITY

THE Third Annual Meeting of the Public Health Association of New York City was held at the Hotel McAlpin May 18.

Speakers at the session on chemotherapy with respect to syphilis and other communicable diseases included Dr. Louise Pearce, of the Rockefeller Institute, and Dr. Reuben Ottenberg, of Mt. Sinai Hospital. On the subject of problems in connection with plans for furnishing medical service to the middle classes of the United States, speakers were: Dr. Michael M. Davis,

Dr. Leo Price, Dr. Haven Emerson, Dr. George T. Palmer, and Bernard S. Coleman.

At the Annual Dinner Meeting, Dr. Louis I. Dublin spoke on the Museum of Health, now included in the Hall of Man, of the Medicine and Public Health Building at the New York World's Fair. The guest of honor at the dinner was Sir William McLean, a member of the British Commission to the World's Fair.

Officers for 1938 were reelected as follows:

President, Hazel Corbin

First Vice-President, Dr. Arthur I. Blau

Second Vice-President, Dr. George T. Palmer

Secretary-Treasurer, Frank Kiernan

HARVARD SYMPOSIUM ON VIRUS AND RICKETTSIAL DISEASES

IT has been announced, by Dr. C. K. Drinker, Dean of the Harvard School of Public Health, Harvard University, Boston, Mass., that registration for the short course of lectures, clinics and demonstrations on the virus and rickettsial diseases—to be given June 12–17—is still open within the capacity of the course.

An outline of this event was carried in the February issue of the *Journal*, page 193.

SMALLPOX IN NEW YORK STATE

AN outbreak of 13 cases of smallpox in the town of Ripley, Chautauqua County, N. Y., with at least 600 others known to have been exposed to the disease, was announced by Dr. Edward S. Godfrey, Jr., State Commissioner of Health. The Ripley outbreak involves 11 adults and 2 children of 6 families. The first case, occurring April 1, was that of a truck driver who traveled between Syracuse, N. Y., and Cleveland, Ohio. The last case occurred on May 15.

This is the second outbreak in the State within the past three months.

BOVINE MASTITIS STREPTOCOCCI CLASSIFICATIONS

AN international study of the streptococci associated with bovine mastitis has been announced in order to arrive at a more uniform classification. Briefly, it has been decided to ask those who are studying mastitis to reexamine their cultures (1) by means of a group B standard serum which will be issued, and (2) by certain relatively simple cultural and biochemical methods. Mimeographed copies of suggested methods and the group B serum will be sent to anyone interested.

Persons resident on the American continent and in Japan should write to Dr. R. B. Little, Rockefeller Institute, Princeton, New Jersey; while those in Europe and the British Empire should communicate with Dr. F. C. Minett, Royal Veterinary College, Camden Town, London, N.W.1, England.

PHARMACOPOEIA REVISION

A CALL for a Convention for the Revision of the Pharmacopoeia of the United States, to be held in Washington beginning May 14, 1940, has been issued by Walter A. Bastedo, M.D., of New York, President of the United States Pharmacopoeial Convention.

Dr. Bastedo points out that, under the present Federal Food, Drug and Cosmetic Act, the standards of strength, quality and purity laid down in the Pharmacopoeia for the drugs and preparations that it recognizes automatically become the legal standards for these preparations.

BALTIMORE RAT PROOFING ORDINANCE

AN ordinance has been passed in Baltimore, Md., as part of a rat control program providing for the rat-proofing of all buildings hereafter erected in the city for the protection of public health and to prevent the introduction or spread of rat-borne diseases.

NEW ENGLAND HEALTH INSTITUTE

STATE Departments of Health, State Departments of Education and State Tuberculosis Associations for the six New England states joined with the New England Health Association in putting on a New England Health Education Institute, April 21 and 22, at the Massachusetts Institute of Technology. This is the first time that such agencies have combined in organizing a special professional program in the Health Education Field. Over 600 persons registered for the Institute.

The costs of the Institute were underwritten in part by certain of the participating agencies, but the \$1,200 secured from the \$2 registration fee made the project practically self-supporting.

The meetings opened with a General Session on Friday morning with a discussion of the "Underlying Psychology for Motivating Health Behavior." On Friday afternoon the practical application of these principles was considered as they apply to the elementary school level, the secondary school level, the college level, and the adult level.

On Saturday 7 separate Sections were held. These sessions dealt with "Educational Aspects of Medical, Dental and Nursing Services in Schools," "Evaluation of Programs," "Types of Measurement in Physical Education Programs," "Problems in Health Service and Health Curriculum in Colleges," "Publicity Methods in Public Health Education," "Health Education in Maternal and Child Welfare," and "Rural Health Education."

A general open meeting on Friday evening was addressed by Dr. Henry F. Vaughan, Dr. H. D. Chope and Dr. Dorothy Nyswander. A Friday luncheon meeting was addressed by Dr. Channing Frothingham, President of the Massachusetts Medical Society, and a Saturday luncheon was addressed by Dr. Howard W. Haggard of Yale

University. Seventy-one speakers and discussion leaders participated in the 2 day program.

The Institute was planned and conducted by an Organizing Committee under the chairmanship of Professor C. E. Turner of the Massachusetts Institute of Technology, with Arthur J. Strawson of the Massachusetts Tuberculosis League as Executive Secretary. The members of the Organizing Committee consisted of the officers of the New England Health Education Associations, the State Commissioners of Health, the State Commissioners of Education, and the Executive Officers of the State Tuberculosis Associations or their special representatives. There were sub-committees on arrangements, membership, cooperating agencies, exhibits, finance, program, publicity, and registration.

Any member of the American Public Health Association who is interested in further details of organization may secure a copy of the program by writing to Professor C. E. Turner, at the Massachusetts Institute of Technology, Cambridge.

HENRY STREET VISITING NURSE SERVICE
HAS NEW HEADQUARTERS

THE Henry Street Visiting Nurse Service is now located at its new address, 262 Madison Avenue, New York City.

This new building, which will be dedicated in the autumn, replaces the property given to the Nursing Service in 1925 by Mrs. Jacob H. Schiff, located at 99 Park Avenue. Two years ago this building, which for fifteen years had housed the administrative staff, was purchased by the City of New York for a Court House site, making possible another building at the present address, all expenses in the acquisition of which have been defrayed from the proceeds of the sale of 99 Park Avenue.

AMERICAN CONGRESS ON OBSTETRICS PROGRAM

THE program for the American Congress on Obstetrics and Gynecology to be held in Cleveland, Ohio, September 11-15, 1939, has been announced. Copies may be obtained from the Conference office, The Annex, 650 Rush Street, Chicago.

The first day, sessions will be given over to considerations of Public Health and Maternity Care, the second day to Providing Continuity of Maternal Care in the Rural Areas, the third day to Federal and State Programs in Maternal Care, the fourth to the problems of Economics, and the fifth to the problems bearing on Education.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE Summer Meeting of the Section on Medical Sciences of the American Association for the Advancement of Science will be held in collaboration with the American Neisserian Medical Society, in Milwaukee, Wis., July 19-24, 1939.

There will be four scientific sessions devoted respectively to The Biology of the Gonococcus, The Diagnosis of Gonococcal Infection, Therapy and Control, and Sulfanilamide and Related Compounds.

SOME NOTABLE RETIREMENTS

"At this time of year it is always necessary to bid farewell, in their official capacity, to some senior members of the public health service. This year brings some especially noteworthy partings. . . .

The same applies to our other Past-President, Dr. Charles Porter, who gave up his post at St. Marylebone on March 15th, after nearly 30 years of service to his borough. Dr. Porter has been so eminent a figure in the work of the Society both as a Branch Secretary, as a member of the Council, as

President, and last, but by no means least, as Honorary Editor of *Public Health* for ten years, until 1936, that any tribute we pay would fall short of adequacy. We feel sure that he will continue to make himself felt in the world of public health and that his activity will remain unabated. . . ."—Editorial, *Public Health* (London), April, 1939.

PERSONALS

Central States

ERVIN J. BRENNER, M.D.,† of Manistique, Mich., Director of the Alger-Schoolcraft Health Department, has been appointed to take charge of the new health service in Schoolcraft County, providing medical, nursing, and hospital care for expectant mothers who would not otherwise be able to secure such care. This service has been organized by the Michigan State Department of Health with Social Security Funds, and will be operated with the coöperation of local physicians.

DR. ALEXANDER M. CAMPBELL, of Grand Rapids, Mich., has been appointed full time Consultant to the Bureau of Maternal and Child Health of the Michigan State Department of Health, Lansing. He will carry on a program jointly sponsored by the state medical society, the W. K. Kellogg Foundation, the University of Michigan, and the State Department of Health, working with the maternal health committees of the county medical societies in the state.

DR. CLAUDE DOLLENS, of Oolitic, Ind., has been appointed Health Officer of Lawrence County, succeeding the late Dr. JOHN S. WOOLERY, of Bedford.

DR. LOUIS J. FREDERICK has been appointed Health Commissioner of

† Member A.P.H.A.

Joliet, Ill., succeeding the late DR. EDWARD J. HIGGINS.

THOMAS E. GIBSON, M.D.,† of Paw Paw, Mich., formerly Director of the Van Buren County Health Department, has been appointed Director of the Venereal Disease Division of the Michigan State Department of Health, Lansing.

ROBERT B. HARKNESS, M.D.,† of Lansing, Mich., Director of the Barry County Health Department, was elected President of the State Council of Health recently, succeeding the late URA G. RICKERT, D.D.S., of Ann Arbor.

DR. WILLIAM HARRY HUTTO † has been appointed Health Officer of Kokomo, Ind., and Secretary of the City Board of Health, succeeding DR. WILLIAM J. MARTIN.†

DR. THOMAS J. MCKEAN, of Montpelier, Ind., has been named Health Officer of Blackford County, to succeed the late DR. ELMER D. SHADDAY.

ARTHUR W. NEWITT, M.D.,† who has been Chief of the Division of Tuberculosis of the Michigan State Department of Health, Lansing, has been appointed Acting Director of the Division of Epidemiology.

DR. EXIE E. WELSCH, who has been directing the mental hygiene program of the Bureau of Maternal and Child Health of the Indiana State Board of Health, has been transferred to the Bureau of Mental Care of the State Department of Public Welfare. She will assist DR. GEORGE C. STEVENS, Director, Division of Medical Care, in organizing the clinics.

Eastern States

LETHA S. ALLEN, R.N.,† formerly Director of the Public Health Nursing Organization of Eastchester, N. Y., has recently been appointed by the Nursing Bureau of Man-

hattan and Bronx to develop a placement and vocational guidance service for public health nurses. This Bureau, which has been working in the institutional field since 1933, is now widening its scope, and offering assistance both to public health nurses and the employing agencies in their problems of placement. It has the tentative approval of the National Organization for Public Health Nursing.

MURIEL F. BLISS, C.P.H.,† who has recently completed a course in public health at Yale University, has accepted a position in health education under the Nassau County, N. Y., Cancer Committee, Mineola, Long Island.

DR. SAMUEL J. DICKEY, of West Chester, Pa., Health Officer of Chester County, has been appointed Director of the Division of Tuberculosis in the Pennsylvania State Department of Health.

DR. FRANCIS H. GLAZEBROOK, Medical Director since 1931 of the Medical Department of the New York Stock Exchange, New York, N. Y., has retired. The Department was discontinued as an Exchange activity on April 1.

DR. CHARLES F. GORMLY, of Providence, R. I., has been appointed Chairman of a Committee on Industrial Health of the Rhode Island Medical Society.

SAMUEL MCCLINTOCK HAMILL, M.D.,† of Philadelphia, Pa., was awarded the Dr. I. P. Strittmatter Gold Medal by the Philadelphia County Medical Society on April 12. Dr. Hamill, who has practised in Philadelphia since 1890, has been active in child welfare work for many years.

DR. HAROLD A. HOWARD has been appointed Health Officer of Wethersfield, Conn., to succeed the late DR. EDWARD G. FOX.

DR. ROBERT S. MILLEN, of Westbury,

† Member A.P.H.A.

N. Y., is taking over the quarters of the discontinued Medical Department of the New York Stock Exchange, New York, N. Y., and will operate a clinic there on his own behalf.

WOODBRIDGE E. MORRIS, M.D.,† Dover, Del., has resigned as Director of the Division of Maternal and Child Health and of the Crippled Children's Service of the Delaware State Board of Health as of May 1, to accept the position of Director of the Birth Control Federation of America, with headquarters in New York, N. Y. The Federation was formed in January, 1939, by a merger of the American Birth Control League and the Birth Control Clinical Research Bureau.

DR. CYRUS E. PENDLETON has been appointed Health Officer of Colchester, Conn., to succeed the late EDWARD J. HOWLAND, M.D.†

DR. JOHN M. RENEHAN has been appointed Health Officer of Ansonia, Conn., to succeed Dr. LOUIS HOWARD WILMOT.

DR. GEORGE E. ROCH has been appointed Health Officer of Willimantic, Conn., to succeed Dr. REUBEN ROTHBLATT.

LESTER A. ROUND, PH.D., has been appointed Director of the Department of Public Health and State Registrar of Vital Statistics for Rhode Island, succeeding EDWARD A. McLAUGHLIN, M.D.†

Southern States

DR. JOHN B. FLOYD, of Richmond, Ky., has been appointed Director of the newly created Bureau of Medical Service of the Kentucky State Department of Health, established to assist the medical profession of the state in providing medical service for the indigent and medically indigent.

DR. JOHN M. HOOPER, of Floydada, Tex., formerly of Pampa, has been appointed Director of Public Health for District No. 1, which includes 60 counties in the Panhandle and South Plains area.

DR. FRANCIS T. ISBELL, of Eastland, Tex., has been appointed Health Officer of Eastland County.

DR. ALBERT G. LEROY, of Atlanta, Ga., has been appointed Commissioner of Health of Toombs County.

COLONEL JAMES CARRE MAGEE, Medical Corps, U. S. Army, at present Executive Officer of the Walter Reed General Hospital, Washington, D. C., has been appointed Surgeon General of the U. S. Army with the rank of Major General. He succeeds MAJOR GENERAL CHARLES R. REYNOLDS, whose term as Surgeon General expired May 31. Colonel Magee is a veteran of 32 years' service in the Medical Corps; and is a World War veteran, having served in the A.E.F. during the entire period of American participation in the war.

Western States

DR. JAMES V. FOLEY has been appointed Health Officer of Bannock County, Ida., succeeding GEORGE H. BISCHOFF, M.D.†

HOWARD L. McMARTIN, M.D.,† of Boise, Ida., formerly Director of the Division of Maternal and Child Health and Crippled Children, of the Idaho State Department of Public Welfare, has been appointed Director of the Division of Public Health of the Department.

DR. JOSEPH L. RICHARDS, of Polson, Mont., has been reappointed County Physician and Secretary of the Board of Health of Lake County.

COURTNEY M. SMITH, M.D.,† of Oregon City, Ore., has resigned as Health Officer of Clackamas County, to become Assistant Health Officer of Portland.

† Member A.P.H.A.

CONFERENCES AND DATES

- American Association for the Advancement of Science. Summer Meeting, Section on Medical Sciences, held in collaboration with the American Neisserian Medical Society—Milwaukee, Wis., July 19–24. Annual Meeting—Columbus, Ohio, December 27, 1939–January 2, 1940.
- American Association of Industrial Physicians and Surgeons—24th Annual Meeting. With the American Conference on Occupational Diseases and Industrial Hygiene. Hotel Statler, Cleveland, Ohio. June 5–8.
- American Congress of Physical Therapy. Hotel Pennsylvania, New York, N. Y. September 5–8. (Following Seminar in Physical Therapy for Physicians and Technicians, August 30–September 2.)
- American Congress on Obstetrics and Gynecology—sponsored by the American Committee on Maternal Welfare, Inc. Municipal Auditorium, Cleveland, Ohio. September 11–15.
- American Dietetic Association—22nd Annual Meeting. Hotel Ambassador, Los Angeles, Calif. August 27–31.
- American Home Economics Association—32nd Annual Meeting, Gunter Hotel, San Antonio, Tex. June 20–23.
- American Library Association. Exposition Auditorium, San Francisco, Calif. June 18–24.
- American Neisserian Medical Society. Milwaukee, Wis. June 20–22.
- American Public Health Association. 68th Annual Meeting. Hotel William Penn, Pittsburgh, Pa. October 17–20.
- American Public Welfare Association, Buffalo, N. Y. June 20–22.
- American Society of Civil Engineers—Summer: San Francisco, Calif., July 26–29. Fall: New York, N. Y., September 4–9.
- American Society of Heating and Ventilating Engineers. Semi-Annual Meeting 1939 (Great Lakes Summer Meeting). Grand Hotel, Mackinac Island, Mich. July 4–6.
- American Water Works Association—59th Annual Meeting. Ambassador Hotel, Chelsea Hotel, Atlantic City, N. J. June 11–15.
- Civil Service Assembly—Eastern Regional Conference. Asbury Park, N. J. June 14–17.
- Convention for the Revision of the Pharmacopoeia of the United States. Washington, D. C., May 14, 1940.
- Educational Frontiers, Conference on. School of Education Building, Stanford University, Calif. July 7–9.
- Food Technology Conference. Under auspices of the Division of Food Technology and Industrial Biology, of the Massachusetts Institute of Technology. Cambridge, Mass. June 28–July 1.
- Health Officers and Public Health Nurses—Annual Conference, under auspices of New York State Department of Health. Grand Union Hotel, Saratoga Springs, N. Y. June 27–29.
- Medical Library Association. Hotel Douglas, Newark, N. J. June 27–29.
- Michigan Public Health Association. Lansing, Mich. November 1–3.
- National Conference of Social Work. Buffalo, N. Y. June 18–24.
- National County Officers' Association. Ogden, Utah. July 17–19.
- National Education Association, and affiliated organizations. San Francisco, Calif. July 2–6.
- National Gastroenterological Association. New York, N. Y. June 1–2.
- National Institute for Traffic Safety Training (Second). University of Michigan, Ann Arbor, Mich. August 14–26.

National Recreation Congress—24th.
Boston, Mass. October 9–13.

National Tuberculosis Association.
Hotel Statler, Boston, Mass. June
26–29.

Pacific Science Congress—Sixth. Under
the auspices of the National Re-
search Council. Oakland, Calif.
July 24–August 12.

Pan-Pacific Surgical Association—Third
Congress. Honolulu, T.H. Septem-
ber 15–28.

Pennsylvania Sewage Works Associa-
tion—13th Annual Conference. State
College, Pa. June 26–28.

Smoke Prevention Association. Mil-
waukee, Wis. June 13–16.

Southern California Public Health As-
sociation. Long Beach, Calif. Janu-
ary 24, 1940.

Symposium on Virus and Rickettsial
Diseases—short course of lectures,
clinics, and demonstrations, with
special emphasis on public health
significance. Harvard School of
Public Health, Boston, Mass. June
12–17.

Texas Public Health Association. Gal-
veston, Tex. October 2–4.

West Virginia Public Health Associa-
tion. Hotel Fairmont, Fairmont, W.
Va. November 8–10.

Western Branch, A.P.H.A. Tenth An-
nual Meeting. Hotel Oakland, Oak-
land, Calif. July 23–28.

Canada

Canadian Public Health Association—
28th Annual Meeting. In conjunc-
tion with the 25th Annual Confer-
ence of the Ontario Health Officers
Association. Royal York Hotel,
Toronto, Ont. June 12–14.

International Hospital Association.
Toronto, Ont. September 19–23.

American College of Hospital Adminis-
trators. Toronto, Ont. September
24–25.

American Hospital Association. Toronto,
Ont. September 25–29.

International Medical Congress of
Uruguay. Montevideo, Uruguay.
Summer of 1939.

Royal Sanitary Institute of Great
Britain. Scarborough, England. July
3–8.

International Federation for Housing
and Town Planning. Stockholm,
Sweden, July 5–13.

Summer Course of Phthysiology. Un-
der direction of Professor Eugenio
Morelli. Carlo Forlanini Institute,
Rome, Italy. July 15–October 15.

International Malaria Course for 1939.
Under direction of Professor Giuseppe
Bastianelli. Ettore Marchiafava
Institute of Malariology, Rome,
Italy. July 24–September 20.

Fifth International Congress on Life-
Saving and First-Aid to the Injured.
Zurich, and St. Moritz, Switzerland.
July 23–28.

World Federation of Education Associa-
tions, Eighth Biennial Congress.
Rio de Janeiro, Brazil. August 6–11.
(SS. Rotterdam Summer Cruise to
South America: from New York,
July 5; from New Orleans, July
10; returning to New York August
27.)

International Congress of Public
Health and Public Safety. Liege,
Belgium. August 12–15.

Third International Neurological Con-
gress. Copenhagen, Denmark.
August 21–25.

International Congress on Public
Cleansing. Vienna, Austria. August
24–28.

Eighth Pan American Child Congress.
San Jose, Costa Rico. August 28–
September 4.

International Conference on Sewage
Works and Disposal. Glasgow, Scot-
land. September 12–18.

Intergovernmental Conference of Ameri-
can Countries on Rural Hygiene.
Mexico City, Mexico. End of 1939
(postponed from November, 1938).

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State Procedures for Communicable Disease Control*

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New York, N. Y.

DURING the meeting of the American Public Health Association in Kansas City in October, 1938, there was a session of the Committee on Evaluation of Administrative Practices at which comment was made upon what appeared to be unnecessarily long periods of isolation required for some of the communicable diseases in certain cities. The health officer of one city referred to explained that while he believed that his isolation regulations were inconsistent with the known periods of communicability of some of the diseases, he had no choice but to enforce them as they were so specified in the state sanitary code.

A request was made that the Committee on Evaluation study the current state procedures for Communicable Disease Control to learn the extent of their variance from or agreement with those proposed by the Committee on Control of Communicable Diseases, and

officially adopted by the American Public Health Association and endorsed and published by the U. S. Public Health Service in three successive editions of 1916, 1926, and 1935. (*Reprint 1697*).

Your invitation to me to take part in your program is, I presume, to hear a report upon this study which has been made from the official documents courteously supplied from the offices of the various officers of state, insular, and territorial health services.

It must be admitted that there is no intrinsic merit in the uniformity of regulations, *per se*, nor is standardization of procedures for the sake of uniformity of practice alone always justified. However, when personal liberty is restricted in the interest of the prevention of communicable disease, under the authority of sanitary laws, ordinances, rules and regulations, it is a matter of official concern and may at any time become a matter of legal intervention, if it appears that the periods of isolation imposed upon infected persons, and periods of quarantine required of exposed susceptible persons are in-

* Read before the Conference of State and Provincial Health Authorities of North America in Washington, D. C., April 22, 1939.

consistent with the known periods of incubation and communicability of the disease in question. Furthermore, the credit of a public service presumably conducted on the basis of exact knowledge of the natural history of disease is at stake, and may easily be brought into disrepute and the reasonable disregard of both the laity and the medical profession, when within neighboring health jurisdictions the same disease is subject to widely varying official restrictions.

Of the 44 communicable diseases of which notification to local or state health department is usually obligatory in the states and other political subdivisions of the United States, I have selected 12 as illustrative of the major factors involved in administrative control.

It can be easily seen that if for each disease and each of the 56 political units under study, every stage of control from notification to terminal disinfection, immunization of susceptibles and discovery of the source or sources of infection were analyzed, the presentation of any useful observations would require an encyclopedic monograph. Any such meticulous and detailed analysis appears to be quite unnecessary in view of the ample evidence of lack of uniform agreement between legal requirement and scientific fact offered in the restricted field of the present study.

I have therefore selected from among the 15 items tabulated for each disease and each state only a few, including the incubation period, period of communicability, isolation and quarantine periods, for our present discussion.

It is customary although by no means universal practice for a state department of health to present in printed form for guidance of its own professional staff and for the convenience and education of physicians, sanitarians, and nurses in official and voluntary health agencies, and for medical institutions

and agencies and practitioners of medicine within the state, a statement of procedures and the phenomena of disease upon which these are based at least for the commoner notifiable diseases.

Among the essential facts to be included in any such official publication are the lengths of the incubation and communicable stages of the disease upon which the isolation and quarantine requirements are based, as well as a precise definition of the duration of and conditions of release from isolation and quarantine.

While much remains to be determined by further and more exact definition of these periods even in diseases with which we have long been familiar, there is sufficiently exact information, officially accepted by the American Public Health Association and the U. S. Public Health Service, and available at nominal cost from the Superintendent of Documents, so that there is no excuse, except a greater accuracy of knowledge on the part of the state health officer or board of health, for any serious discrepancies in the procedures recommended. Taking the requirements applicable to these 12 diseases as convenient examples I can express in relatively brief form the range of variance in the practices as provided for (I cannot say in all instances observed) in the several states. In using the term states I include for convenience, Washington, D. C., the Canal Zone, Hawaii, Alaska, Philippine Islands, Virgin Islands, and Puerto Rico.

1. CHICKEN POX

Chicken pox has a recognized incubation period of from 14 to 21 days and a period of communicability of not more than 6 days from the appearance of the first crop of vesicles and certainly not more than 10 days, regardless of the disappearance of primary or secondary scabs and healing of the

lesions on skin and mucous membranes.

Seven states do not require the reporting of chicken pox. Twenty-five states either fail to declare the incubation period or state it to be 14 to 21 days. A few states make a routine practice of verifying diagnosis in cases reported in persons over 15 years of age, and in 1 state for persons over 12.

Isolation is required by 17 states "until the scabs disappear."

Twenty-two states fix the period of isolation at anywhere from 6 to 21 days. Thirteen of these specify that in any event scabs must have disappeared prior to release. Only 2 states definitely commit themselves to an isolation period of 6 to 10 days from the appearance of the first vesicle.

While there is no known benefit to the patient, to susceptible contacts, or to the public at large, from quarantining susceptibles exposed to chicken pox, there are 7 states which require quarantine of adult contacts, and 15 which require quarantine of child contacts. Five other states leave quarantine to the discretion of the local health officer in the case of adult contacts and 4 in the case of children. In 1 state daily inspection of contacts for 21 days from last exposure to chicken pox is required.

In 16 states concurrent and terminal disinfection is called for, in 11 concurrent alone, and in 2 terminal alone.

2. DIPHTHERIA

Diphtheria has a recognized usual period of incubation of 2 to 5 days. The period of communicability, while determinable with considerable precision by culture methods, is usually less than 2 weeks, rarely over 4, and only in exceptional instances a convalescent carrier state continues for 2 to 6 months.

The questions we are mainly concerned with are: When should we begin with cultures for release from isolation? When should we release from isolation if culture control cannot be

had? At what time after the onset of the disease should we apply the virulence test to determine whether a convalescent carrier need be further isolated?

In 29 states the incubation period is officially declared to be not more than 7 days (almost all specify 2 to 7 days); 19 states make no declaration on this point.

Thirty-eight states require for release from isolation 2 negative cultures from nose and throat with at least a 24 hour interval between. One state requires only one negative nose and throat culture. Among the states requiring 2 negative cultures for release, 24 specify the time at which the first culture may be taken, from 7 to 21 days after onset of the disease.

A virulence test is called for in the regulations of 22 states, the time when this is first to be applied varying from 2 weeks to 6 weeks after onset of the disease. In 4 states the time when the virulence test is to be made is not specified.

Quarantine procedures must be analyzed according to the status of the contacts, *i.e.*, adults or children, susceptible or not, for each of which classes of contacts there are various procedures in the several states.

Eleven states do not isolate adult contacts except food handlers or those in occupational relation to children. Twenty-six states release adults on one or two negative cultures. One state quarantines all adult contacts until the death or recovery of the patient. One requires food handlers to live elsewhere if they return to their work when they have had two negative cultures.

For immune children 8 states require quarantine, 4 require negative Schick test before release; 28 require negative cultures before release; 6 states leave all quarantine of adults and children to the discretion of the health officer.

For susceptible children 10 states re-

quire passive immunization or a Schick test; 17 release a child on a negative culture; 9 require absolute quarantine; 1 requires quarantine up to 7 days after release of the patient.

Two states require fumigation of upholstery and 1 requires destruction of all articles exposed to patients' discharges which cannot be sterilized.

3. DYSENTERY (AMEBIC)

In amebic dysentery, neither isolation of the patient, nor quarantine of contacts is recommended.

The basis of release from isolation which is commonly required varies as follows: 7 states release from isolation only on several negative stool findings at various intervals; 1 state requires 3 negatives at 24 hour intervals, and then monthly for 4 months, and thereafter once every 6 months; 1 holds the patient for 5 days and releases on repeated negative stool specimens: 1 releases on 2 negative specimens with a week's interval; 1 releases on 3 negative specimens with a week's interval; 3 on 2 negatives with a day's interval. In some instances these regulations apply only to sick food handlers, in others to all patients.

4. DYSENTERY (BACILLARY)

The recommended procedure is isolation during the period of communicability, which is believed to be while the fever lasts and the infecting organism continues to appear in the bowel discharges. This may be as long as 4 weeks, and may continue into a carrier state. Rigid precautions by attendants are advised and quarantine of contacts is not recommended. An incubation period of 2 to 7 days is recognized.

Fourteen states declare the incubation period to be 2 to 7 days, the others make no mention of this in their regulations.

Isolation is required by 2 states for 10 days after the patient's temperature

is normal; 7 states release after repeated negative stools following normal temperature; 2 release after 3 to 4 weeks. Eight states release on negative stool findings specified as to number and intervals, *viz.*, 3 require 3 negative stools with one day intervals; 3 require 2 negatives with one day interval; one requires 4 negatives at 5 day intervals; one requires 2 negatives after a 4 week isolation period.

No state requires quarantine of contacts.

5. RUBELLA—GERMAN MEASLES

The recognized incubation period is 14 to 21 days, usually 16. The period of communicability is from the onset of catarrhal symptoms for at least 4 days but not more than 7 days. Isolation of patients is rarely practicable but it is recommended for the presumed period of communicability. Quarantine of contacts is not recommended.

Reporting is required by all but 5 of the states. The incubation period is declared by 24 states, all but 2 adopting the period 14 to 21 days, while 1 uses a 14 day period, and 1 a 10 to 21 day period. Twenty-eight states make no mention of the incubation period in the regulations.

Isolation for the recommended period of 4 to 7 days is required by 28 states, with 4 states requiring 8 days, and 1, 4 days from appearance of the rash. Of the other states 16 mention no isolation period, and 3 leave it to the discretion of the attending physician or health officer; 1 holds the patient for 5 days after the disappearance of the rash; 1 holds for 10 days from onset; 1, 16 days; and 1, 21 days.

Quarantine of susceptible children is required by 9 states; in 5 states for 14 days after exposure; in 1 for a period from the 10th to 22nd day after exposure; in 2 for 21 days from exposure and in one for 14 days after a 10 day interval since exposure.

6. MENINGOCOCCUS MENINGITIS

The incubation period is recognized as being 2 to 10 days, commonly 7, and the period of communicability during the clinical course and until the infecting organism is not found in nose and mouth secretions, usually 2 weeks. Quarantine of contacts is not recommended.

All but 4 states require notification of the disease. Twenty-eight states do not mention the incubation period. Twenty-one states declare it to be 2 to 10 days, while 1 state gives it as 16.

Isolation of the patient is terminated on the basis of negative cultures, usually specified to be taken after an interval of days after the onset of the disease by 14 states, and without culture by 17 states. Release is at the discretion of the health officer in 4, and is not specified by 9 states. Three negative cultures are required by 4 states, with 5 day intervals or less the first taken 2 to 3 weeks after onset. One state requires isolation to last until recovery, death, or transfer of the patient.

Quarantine of contacts is not required by 8 states, and its duration is not specified by 6 states. It is required that all contacts be held at the discretion of the health officer in 9 states. Contacts are released after 14 days (in two instances after 10 days) on negative cultures. Contacts who remain at home are released in 1 state 1 week after the patient is isolated, and in 13 states are held for a 2 week incubation period, and in 2 states for a 10 day period.

7. TYPHOID FEVER

The accepted period of incubation is 7 to 38 days, usually 7 to 14. The period of communicability is from the appearance of prodromal symptoms until the discharges are free from the infecting organism.

The incubation period is not speci-

fied in 16 states. It is declared to be 7 to 14 days by 3 states; 7 to 24 days by 1 state; 1 to 21 days by 1 state; 7 to 21 days by 2 states; 7 to 23 days by 11 states; 14 to 21 days by 1 state; 7 to 16 days by 1 state; 14 days by 1 state; up to 30 days by 1 state.

Release from isolation is neither required nor referred to by 7 states. Release on the basis of negative cultures of feces and urine is required by 34 states of which 14 do not specify the number or interval between specimens, nor the time when the first specimen is to be taken. The practice recommended, *i.e.*, release after 2 negative cultures from urine and stools taken 24 hours apart, is specified by 5 states. Release is permitted after 3 negative cultures at 24 hour intervals by 2 states; 2 specimens 1 week apart by 1 state; 2 specimens 5 days apart in 1 state; 2 specimens 7 days apart in 4 states; 3 specimens at 1 week intervals in 1 state; 2 negative specimens 3 weeks apart, the first taken 10 days after clinical recovery in 1 state, 3 negative specimens at 4 day intervals in 1 state. The time for taking the first specimens varies from 6 to 10 days after the patient's temperature returns to normal or there is clinical recovery.

In 1 state release follows 7 days of normal temperature without release cultures.

8. MEASLES

The accepted facts about measles are that the incubation period is 8 to 10 days from exposure until the onset of fever, or 12 to 14 days from exposure to appearance of the rash, rarely as long as 18 days.

The period of communicability begins with the catarrhal symptoms and lasts until abnormal secretions of mucous membranes cease; from 4 days before to 5 days after appearance of rash.

Isolation is recommended during the period of communicability.

Exclusion of exposed susceptible children and teachers from school for 14 days from last exposure may be justifiable. With date of a single exposure known, an exposed susceptible school child may attend school for the first 7 days of the incubation period.

In 10 states the regulations are consistent with the above facts in all essentials. The incubation period is not specified in 19 states; is given as 7 to 14 days in 1 state; 7 to 18 days in 3; 6 to 18 days in 1; 8 to 21 days in 2; 10 to 14 days in 1; 1 to 14 days in 1; 14 days in 5 states.

The isolation period is consistent with the facts in 13 states; is required for 14 days after notification in 1 state; 10 days in 3; 7 days in 6; 5 days after disappearance of symptoms in 5; 7 days after disappearance of symptoms in 7; 8 days after disappearance of symptoms in 1; there is no specification in 3; and the duration of isolation is at the discretion of the health officer in 4.

Quarantine: for adults there are no restrictions in 9 states; 14 days of quarantine are required in 13 states of which 6 specify school teachers; the quarantine periods are at the discretion of the health officer in 7 states.

For children there are no restrictions in 2 states; quarantine is required for 14 days from exposure in 22 states; for 7 to 17 days in 2 states; at the discretion of the health officer in 4 states.

9. MUMPS

The accepted incubation period for mumps is 12 to 26 days, most common 18 days, and 21 days not uncommon. Communicability is assumed to be from onset until the parotid gland has returned to its normal size.

Twelve states have procedures essentially consistent with the accepted facts.

Six states do not require reporting; 39 do.

The incubation period is declared to

be 12 days in 1 state; 14 days in 1; 4 to 30 days in 4 states; not less than 21 days in 1; is not specified in 18.

Isolation: In 22 states children are isolated and excluded from school while in the communicable stage, although none of these states defines the period. In 4 states isolation is required for 2 to 7 days; in 1 state for 10 days; in 1 state 3 weeks from onset; in 1 until recovery; in 2 states 2 weeks from onset and 1 week after swelling of parotid has disappeared.

Quarantine: Most states do not require quarantine of exposed susceptibles. In 4 states quarantine is at the discretion of the health officer; in 7 states it applies to susceptible children for 21 days, with or without daily inspection of the child.

10. SCARLET FEVER

The accepted facts regarding scarlet fever are, that the incubation period is 2 to 7 days, usually 3 to 4, and a period of communicability usually 3 weeks from the onset and until abnormal discharges have ceased and open sores or wounds have healed, regardless of stage or extent of the desquamation.

Fourteen states accept the facts as to length of the incubation period; 2 states specify 2 to 10 days; 1, 10 days; 4 specify 3 to 4 days; 1, 14 days; 12 do not specify duration.

The isolation period required in 25 states is 21 days; in 8 states it is 28 days; in 1 state 14 days; in 1 state 30 days; in 1 state until complete recovery; in 3 states at the discretion of the health officer; in 12 states it is not specified.

Quarantine is as recommended in 29 states, *i.e.*, exclusion of exposed school teachers and children from school, and food handlers from their occupation, for 7 days from last exposure (6 release earlier on negative Dick test); 8 quarantine at the discretion of the

health officer; 4 do not quarantine adults if the patient is isolated; 4 maintain quarantine of members of the household for the duration of the patient's illness.

11. POLIOMYELITIS

An incubation period of 7 to 14 days is accepted as common. The period of communicability is not definitely known, but is believed to include the latter part of the incubation period and extend after onset of the disease for a week or two and possibly much longer. Tracing of a case to a previous case is rare.

In one state the disease is not reportable.

An incubation period of 7 to 14 days is so defined by 10 states; is specified to be 6 to 21 days by 1 state; 3 to 10 or 14 days by 5 states; 2 to 3 days by 2 states; 10 days by 1; 14 days by 1; and is not mentioned by 17 states.

Isolation is required for 2 weeks from onset by 15 states; 3 weeks by 18 states; at the discretion of the health officer by 3 states; no duration is specified by 4 states.

Quarantine of adults and immune or susceptible children is required as recommended by 17 states; quarantine of adult wage earners is not required if the patient is isolated, by 4 states; is required of exposed adults in contact with children or food handlers for 21 days in 4 states; release from quarantine is permitted after disinfection and removal to other residence by 1 state.

For immune children quarantine is not required if they are removed from the household and public places in 3 states; is required for 10 days in 1 state; for 21 days in 5 states; at the discretion of the health officer in 5 states.

For susceptible children: quarantine is not required if they are removed to a household where there are no other

children in 2 states; for 10 days in 1 state; for 21 days in 5 states; at the discretion of the health officer in 6 states.

Two states require gaseous disinfection at termination of the case.

12. PERTUSSIS

The accepted incubation period is commonly 7 days, almost uniformly within 10 days, and not exceeding 16 days; the period of communicability is believed to be from the beginning of the catarrhal stage for 7 to 14 days until 3 weeks after the development of the characteristic whoop.

The incubation period as stated above is accepted by 15 states; is specified to be 10 days by 1 state; 14 days by 2 states; 16 days by 1 state; 14 to 21 days by 2 states; 4 to 14 by 4 states; and is not specified by 11 states.

All states require isolation of the patient; 6 for the period of communicability; 1 for 1 week after onset of the whoop; 2 for 2 weeks from the whoop; 6 states for 3 weeks; 6 states at discretion of the health officer; and 3 for an unspecified duration.

Quarantine of exposed susceptible children is required as recommended for 10 days after last exposure by 11 states; for 14 days by 1 state; for 16 days by 1 state; at the discretion of the health officer by 8 states; during the illness of the patient by 3 states; only for children in institutions in 1 state; for an unspecified duration by 4 states.

One state requires terminal fumigation.

COMMENT

The inconsistencies between reasonably exact experience or observation of incubation and communicable periods of these notifiable diseases and much of the regulation of isolation and quarantine as implied or specified in the publications of state health authorities,

and in the main obligatory upon the respective subordinate health jurisdictions of the states, appear to me to be so considerable in number and degree as to justify your attention.

In spite of these evidences of somewhat irresponsible exercise of the powers of state health authorities in this, the oldest field of preventive medicine, a field full of triumphs and general progress, the present status of communicable disease control is encouraging. Still greater success, with less annoyance to the patient, his family, and the public can probably be achieved if administrative requirements and practice are brought more nearly into agreement with our knowledge of the natural history of these diseases.

Among the multitude of obligations, which should be met by state health authorities in the traditional fields of their authorized functions, namely, to do their own work with approximate

scientific accuracy, before they attempt the difficult and intricate functions of organized care of general medical and surgical illnesses, are those which involve the control of communicable diseases.

It seems to me that the best way to earn merit and the confidence and support of the public for essential health functions is to do the duties now required by law so well that no reasonable criticism from the public or the medical profession can be brought against you.

Rather than to encourage the exercise of persuasion and publicity and politics to have new functions and extensive new funds and duties added to you, for which in the main you lack essential experience and professional qualifications, I urge you to serve in the best possible way with your present resources those functions which no one else can carry on under the law, or is so well prepared for as you are.

The Selenium Problem and Its Relationship to Public Health*

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IN the preparation of this review reference has been made to 78 published studies on the selenium problem and its various aspects. These articles embrace only those written in the last 5 years. It is the desire of the writer to call special attention to the splendid contributions to this subject by Stenn, Moxon, Dudley, Franke, and Byers and his associates.

The earliest description of what was probably selenium poisoning is found in Marco Polo's accounts of his travels in the 13th century. In this country the Sioux Indians told the white man of a legend based on its effects. Probably the first recorded account of toxic forage was made in 1856 by Dr. T. C. Madison, an army surgeon stationed at Fort Randall, Territory of Nebraska, now more specifically located on the Missouri River in South Dakota. Since then Mayo, Peters, and Lipp, and others have further implicated Wyoming, Nebraska, and South Dakota. These early observations showed that horses, cattle, pigs, chickens, and mules were the principal animals affected. No mention is made of any human involvement. In 1937, Byers described an interesting

situation that he found in Mexico. In a certain valley of that country there has existed for more than two hundred years an obscure disease known as "soliman" whose symptoms bore an exact resemblance to those of "alkali disease."

Although these isolated observations were a matter of record, and stock poisoning continued to be a malady reaching serious proportions, very little if any light was thrown upon the problem until 1934. In this year, Franke reported experiments indicating that the cause of the trouble was resident in the ration. He showed that grain grown in areas where it was known that animals became toxic caused definite symptoms of poisoning when fed to rats. From this time on the solution to the mystery unraveled itself rapidly. Robinson discovered selenium to be present in the toxic grain. Byers showed the wide, though spotty presence of selenium in shale soils. Hurd-Karrer demonstrated the fact that plants could take up selenium from the soil. Finally, Franke proved the implication of selenium by demonstrating that selenium salts when fed to rats produce the same results as when toxic grains were added to the ration. It is true, that Byers showed chromium, vanadium, arsenic, molybdenum and tellurium to be present in the soils along with selenium and

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that some of these metals were also found in plants. Nevertheless, the work of Franke and others points conclusively to selenium as the toxic factor producing the symptoms of the condition known commonly as "alkali disease" or "blind staggers."

What is now known as selenium poisoning was called "alkali poisoning" in the earlier days. This appellation is now known to be a misnomer for the disease is neither directly nor indirectly caused by alkali water or by alkali spots in the soil. There are two forms of selenium poisoning among livestock. One is an acute form "blind staggers" which is the predominant type in South Dakota, and the other is a semi-acute or chronic form "alkali disease" which is the predominant type in Wyoming.

There is a very definite similarity between selenium, sulphur, and tellurium. They have chemical and physical properties in common. Nutritionally, selenium is regarded as of no importance, but the similarity of selenium and sulphur and the value of the latter in the oxidation-reduction mechanism make it seem possible that in sub-lethal doses, selenium might play a nutritive rôle. Selenium was the only one of the elements used that caused liver pathology in rats. In toxic cereals it is present for the most part, if not exclusively, in organic combination and is probably not in a high state of oxidation. It is bound in the protein molecule in such a manner that it will go into solution only after the protein has been hydrolyzed. Available evidence favors the belief that selenium may be able to displace sulphur in the cystine and methionine molecules. Jones has shown that selenium is associated with cystine and the selenium analog of cystine has been prepared by a couple of workers. For nearly every organic sulphur compound, a selenium homologue has been prepared. These sele-

nium compounds resemble those of sulphur in both their preparation and their reaction.

The amount of selenium in wheat is not proportional to the amount in the soil which may indicate that there is a difference in the forms in which it occurs, and in their availability. The toxicological features of organic selenium compounds may be entirely different from those of the inorganic compounds. In the body, selenium undergoes some type of change for it occurs as an organic protein-like complex in the red corpuscles and as an ether soluble volatile fraction in the urine.

Plants differ greatly in their ability to take up selenium from the soil, and consequently it is present in plants in concentrations which range from traces up to quantities that are lethal to animals. It is the only mineral known to be absorbed from the soil by food plants in sufficient quantities to render them lethal to animals. It may be absorbed in larger quantities in dry than in wet seasons.

There are certain native plants that always contain selenium when they are grown on seleniferous soils. In fact, it appears that some plants called "indicator plants" are incapable of growing on a soil unless it contains this element which may indicate that it is essential for their growth. In one variety of plant, at least, it was shown that the growth rate could be accelerated by the addition of selenium to the soil. These plants are capable of taking selenium out of soil to a much better degree than other plants, and by their death and disintegration steadily enrich the soil in an available form of this element. Other forms of vegetation will therefore show a marked variation in selenium content depending upon the proximity to or absence of these plants. For this reason "indicator plants" are also called "converter plants."

The absorptive power of plant life for selenium depends upon the degree of rainfall, leaching, weathering, the composition of the soil, the geological outcrop upon which the plant material grows, the species of plant, the presence of converter plants, available sulphur, the stage of growth of the plant, and the part of the plant examined. So far as is known at present, no crops grown on a large scale have any special absorptive power for selenium, but all the plants so far investigated absorb some.

Toxicity of cereal grains may vary with the season, with the maturity, and with the length of the storage period. It is thought that the toxicity of selenium depends largely on the ionic combination in which it occurs. All experimental evidence is against the assumption that a tolerance for selenium can be acquired. It favors rather the belief that selenium shows cumulative effects. While the lethal dose of selenium in vegetation is approximately 2 milligrams per animal pound, no minimal concentration at which selenium may be harmful has yet been found. Amounts of selenium less than lethal, have a definite inhibitory effect on the growth of young animals.

Selenium is widespread in the earth's crust, occurring in small quantities (0.005 per cent) in the combined and in the free state. All soils of pyritiferous origin and not exposed to the leaching effect of rainfall, should show the presence of selenium. Primarily, selenium is volcanic in origin. It has been found associated with sulphur in the volcanic emanations. Rain washes the selenium from the air and deposits it in the soil. There the percolating waters gradually leach out the selenium and carry it down to the sea where shales of the upper cretaceous period were formed. The distribution of dust and gaseous material of volcanic origin is world-wide. In the North Central Plains, selenium was deposited con-

temporaneously with periods of high volcanic activity of the Rocky Mountains. It may therefore be said that no soils and especially no ferruginous soils exist in which selenium cannot be found. Soils of arid and semi-arid regions that have in the past been exposed to volcanic action and which have not been exposed to the leaching effect of water may be expected to contain selenium. Many of the toxic districts existing in the Rocky Mountain area have been brought about by vegetable enrichment of selenium through countless cycles of growth and decay of the indicator or converter plants already described.

Selenium has been found not only in the soil and in the crops, but also in the water of temporary springs and in the drainage from irrigated lands. Usually, however, the water supplies of seleniferous areas are either free or so low in selenium as to preclude any possibility that they might be responsible for serious injury unless this water be used for irrigation purposes.

The distribution of seleniferous areas is so widespread (12 states are definitely known to possess such areas and 2 others are suspected), and the economic and public health aspects of the situation so critical that much effort has been and is being spent in determining the best manner to meet the difficulties presented. Some effort has been made to mitigate the toxic effect of grain by storing it for several years before using it. Hurd-Karrer showed that the addition of sulphur to selenium-containing soils reduced the absorption and assimilation of selenium by plants. This has not been borne out in practical trials. Even if it were proved correct, economic considerations would bar its use because the cost of the sulphur would exceed the cost of the land.

The same would be true probably for the use of iron. It has been shown that basic iron reacts with selenite to

produce an insoluble compound. Highly ferruginous soils convert absorbed selenium to a highly insoluble form—a basic ferric selenide.

Moxon has recently made some most interesting observations. When arsenic is fed along with seleniferous grains to rats, the characteristic symptoms of poisoning do not occur. As little as 5 p.p.m. of arsenic in drinking water protects the liver from injury. The animals also remain free from the other symptoms characteristic of this intoxication. Compounds other than arsenic that are non-toxic in themselves have also given promising results.

Physiologically selenium salts may be reduced in the body to the metallic state, as for example by glucose. If this occurs in the intestinal tract, the insoluble material may then be eliminated with the feces. The absorbed selenium undergoes changes whereby some is excreted by the lungs in a volatile form—methyl selenide—and another portion in the urine as an ether soluble volatile compound. It has been noted that animals are capable of detecting minute traces of selenium in forage plants or rations and will avoid them whenever possible. As the result of such observations, it has been suggested that seleniferous areas be allowed to revert to prairie and be used only for grazing purposes.

The federal government is aiding in the solution of the problem by cutting out of agricultural use large areas of seleniferous land. Already about 100,000 acres have been removed from use by outright purchase under the marginal land purchase program.

The participation of the government in the solution of the selenium problem is evidence of its seriousness. Because of the tremendous economic aspects of the problem, the toxicological phases of the research were directed exclusively to the study of animal involvement. Not until the last two years has there been

a great enough realization of the economic and sociologic phases of human involvement to divert some of this research into this aspect of the problem. Since 1936, Dudley has published a few reports on selenium as an industrial hazard, and Smith and his associates have published two reports of surveys made of the inhabitants of involved areas. In contrast to these meager reports are dozens of publications dealing with selenium poisoning in stock, farm animals, and poultry.

In many respects the very nature of the problem is such that animal experimentation must precede studies of human involvement. Experiments on the toxic effect of selenium have been carried out with rabbits, rats, cats, dogs, hogs, calves, fish, and sheep. The pathology and symptoms of selenium poisoning to be described will be, therefore, largely those determined by animal experimentation. The results will be presented concisely and as far as possible correlated with the findings obtained from human studies.

It must be recalled that selenium occurs in vegetation in variable quantities. It is therefore possible that animals feeding over various areas or animals fed rations obtained from different districts may manifest degrees of selenium poisoning ranging from mild to very severe. With a highly toxic ration a sound animal will in a few hours or several days at the most, refuse to eat, become blind, drool profusely, and begin to wander about aimlessly. With a less toxic ration there will be noted a decreased rate of growth, a restricted food intake, an impairment in the general appearance, marked anemia, and, upon necropsy, gross evidences of abnormality.

Little is known of the relative susceptibility of farm animals to the poisonous effect of selenium. It is stated that the untrained individual does not easily recognize selenium

poisoning until the case is well developed. By that time the tissues have been permanently injured. The symptoms and pathology of selenium poisoning have been described under two heads: acute and chronic.

Animals suffering an acute poisoning have a marked pulmonary congestion or edema, hemorrhage and edema, general muscular weakness, labored respiration, and asphyxial convulsions. Animals dying early show little pathological change except for varying degrees of congestion, hemorrhage, and edema of the lungs. The large collections of fluid in the pleural and peritoneal cavities cause an anhydremia which in turn explains the high hemoglobin values found in cases of acute poisoning.

In human beings selenium is partly eliminated by the breath in the form of methyl selenide, a volatile compound which gives rise to the odor of garlic. This method of excretion as well as inhalation possibly accounts for the painful and prolonged bronchitis and pharyngitis found in humans exposed to selenium in the air. There is also an excessive secretion accompanying these disturbances.

Catfish living in water to which selenium has been added become very anemic. On severely toxic diets, rats also develop a progressive anemia frequently showing, in the severe cases, red cell counts as low as 450,000. The hemoglobin usually shows lower values than the red cell count. Often there is a marked reticulocytosis, reaching as high as 8 per cent. The anemia, when well developed, is essentially hypocytic and hypochromic. Anemia, however, has not been described as a symptom of selenium poisoning in humans.

When inorganic selenium or seleniferous grain is added to a ration, food consumption decreases as the quantity of poison increases. Rats voluntarily reduced their food intake to as little as 25 per cent of the normal. There fol-

lowed a corresponding decrease in the rate of growth in the young or a loss of weight in the older animals. Many animals literally starved themselves to death rather than eat the food. The rats would assume a hunched position, their fur would become rough and stained a brilliant yellow around the genitals due to the excessive amount of bile pigment in the urine. Young rats are more susceptible than old ones. Animals on toxic diets do not reproduce well. If both mates were fed toxic food, the matings were infertile. If one animal was fed toxic food and the other a normal diet, occasional fertility resulted. Affected females could not raise young. Rats receiving as much as 17.5 p.p.m. of selenium in their food had no change in the basal metabolic rate.

Chicks hatched from eggs into which selenium salts have been injected were greatly deformed. Similar deformities occurred in eggs laid by hens fed toxic grain. Hens fed diets varying in the amount of selenium showed an equal variability in selenium in their tissues. When chickens were raised on a ration containing 65 per cent toxic grain, there was noted an inhibition in the rate of growth and a decrease and delay in egg production. Egg weights were less. After 6 days of feeding deformed embryos occurred. A continuation of the feeding for 6 more days resulted in complete loss of hatchability.

In acute poisoning in the hog, calf, and sheep, selenium was found in the blood, bile, and urine. The liver, kidneys and spleen contained the largest amount while less was found in the heart, brain, muscles, and lungs.

Acute effects of the ingestion of soluble selenium compounds may be summarized as consisting primarily of early cellular destruction of the liver with later pathological changes throughout the organism. The ingestion of small amounts of selenium compounds

over a long period results in retrograde changes in the liver and kidneys accompanied by a general debility.

After chronic selenium poisoning in rats, the liver, spleen, kidney, and pancreas contained the greatest concentration. In both rats and rabbits, the continued administration of selenium produced cumulative effects. Much of the selenium appeared susceptible to detoxication. Excretion of selenium is rapid at first, but traces remain for a long time. Animals dying after a prolonged exposure to selenium showed not only pathological liver changes, but serous effusions as well. It was noted that pathological changes occurring as a result of as little as 10 days' feeding were never repaired. Rats' stomachs showed a diffuse atrophy of the mucosa with areas of necrosis and ulceration. The liver changes were those of a periportal cirrhosis. The heart muscle and renal tubules were degenerated.

In a study of chronic selenium poisoning in the hog and horse, a distribution of selenium in the tissues similar to that in acute poisoning was observed. High concentrations of selenium were found in the hoofs. It is believed that selenium replaces sulphur in certain amino acids which are utilized in hoof formation. It was observed that cattle poisoned on the range improved when removed to better forage but never recovered from the injury done the liver and kidneys.

Hemorrhages occurred in the subcutaneous tissue and the muscle fascia near the joints. In the joints themselves—especially those involving the long bones—there was marked erosion of the articular surfaces. In horses, cattle, and swine there was a loss of hair from the mane, tail, switch, and body.

How near may the pathological changes and the symptoms of selenium poisoning as observed in animals par-

allel those occurring in man? It is stated that normal urine does not contain selenium and that if urinary selenium is found, it indicates exposure and absorption. In one of the surveys to which reference has already been made, 111 families living in a seleniferous area were examined. Ninety-two per cent of them showed the presence of selenium in the urine. The quantity ranged from 2 to 133 micrograms per 100 cc. Forty-seven and two-tenths per cent of these urines contained over 20 mg. per cent of selenium. The urine from horses showing definite evidences of selenium poisoning contained from 33 to 170 mg. per cent. Many of these individuals showed symptoms of chronic selenium poisoning. In humans as in animals it was found that the younger the individual the greater the effect of selenium.

In selenium poisoning of industrial origin, the symptoms were pallor, gastrointestinal disturbances, a garlicky odor of the breath and perspiration, irritation of the nose and throat, a coated tongue, a metallic taste in the mouth, and nervousness. In the surveys of human beings living in seleniferous regions, there were described vague symptoms of anorexia, indigestion, a general pallor, and malnutrition. From the amount of selenium in the urines of these individuals, it is probable that they were absorbing this element in quantities ranging from 0.01 to 0.2 mg. per kg. per day. All of these individuals had lived on seleniferous farms over 3 years, and most of them from 10 to 40 years.

A more detailed recital of the disorders found among people studied in these surveys includes (a) gastrointestinal disorders, (b) icteroid discoloration of the skin with a history of recurrent jaundice, (c) a sallow, pallid color, (d) rheumatoid and deforming types of arthritis, (e) cardio-renal disease and edema, and (f) changes of the skin

including dermatitis, pigmentation, diseased nails, and bad teeth.

So far human selenium poisoning has not been reported in the toxic areas but because of its occurrence among animals, definite absorption by humans of quantities known to be toxic to animals and the fair degree of resemblance in the symptoms between humans and animals, there is no reason to believe that it does not occur.

Workers in this field have been very cautious in their utterances. One has stated that although there was no definite correlation of symptoms and their incidence with the urinary selenium concentration, the assumption that selenium is harmless is not warranted. He feels that some of the signs of ill health are the direct result of a more or less continuous ingestion of small amounts of selenium over a long period of time. He adds further that symptoms existing in people with low selenium values can be explained as being due to chronic irreparable damage caused at some time in the past.

Intimately connected with the general problem of selenium poisoning as a health hazard to man are the following: (1) the precise sources of selenium to which man is exposed; (2) chemical nature of selenium; (3) the probable amounts absorbed by man in the places where exposure is known to occur; (4) the limits of tolerance, that is, how much may be absorbed with impunity. The selenium to which man is exposed—at least from food sources—is probably for the most part organic in nature. It does not seem probable that as little as 5 mg. of selenium daily could be absorbed more or less continually with impunity.

Man is exposed to the absorption of selenium from two sources—occupational and nutritional. Industries where selenium is a hazard can be divided into primary and secondary classes. The primary group includes industries

which extract, mine, treat, or process naturally occurring minerals which contain selenium in appreciable quantities. The secondary group includes those industries which use selenium or selenium compounds as basic materials for manufacturing processes. The production of dusts, fumes, vapors, or liquors presents opportunities for the introduction of selenium into the body by absorption through the skin, inhalation, and ingestion. That these are definite industrial hazards is attested by the fact that selenium has been found in the urine of workers so exposed.

Mention should also be made of the use of Selocide—a selenium compound used as an insecticide for the control of the Pacific mite and the citrus red spider. Soils catching the run-off spray were also found to contain selenium.

Byers has set the tolerance limit of selenium in foods at 4 p.p.m. It is stated that the form of selenium occurring in cereals is more toxic than the inorganic form. Nearly all the selenium in wheat is concentrated in the gluten fraction. Two samples of gluten contained 0.8 and 15 p.p.m. Since the gluten of wheat carries most of the selenium, the examination of gluten proposed for special diets becomes of extreme importance.

Wheat, corn, barley, and emmer from seleniferous areas have been found to contain selenium. The degree of toxicity is in the order named. Hens fed a toxic grain in their ration, laid eggs that contained selenium. This was equally divided between the white and the yolk. Their own flesh contained selenium in rather high proportions. The selenium content of the eggs and flesh increased as this element increased in the ration.

In several areas in the United States, it has been shown that irrigation tends to diminish the effect of selenium on plants but this was not so when the

irrigation water contained selenium. Irrigation cannot be considered a remedial measure if the water contains selenium. This fact is well illustrated by the findings of Byers in his study of conditions in a certain valley in Mexico. The river water used for irrigation purposes was found to contain selenium. As a result, all vegetables, milk and meat raised in that valley contained selenium. Of special interest in this connection is the finding that Colorado River water at Topock, Ariz., after it has drained seleniferous areas contains 3 parts per billion of selenium. At Yuma it had increased to 4 parts. Similar findings should be expected in other rivers draining seleniferous areas. Now that the water from the Colorado River is to be used for irrigation purposes, the selenium that was carried into the Gulf of Mexico will be deposited in the soils irrigated and thus actually build up new seleniferous areas.

Smith and his coworkers found that foods raised in seleniferous areas gave high selenium values as Table I shows. The values are given in micrograms per 100 cc., or grams of material.

TABLE I

Micrograms per 100 cc.

Beets	0- 118
Beans	38- 204
Bread	25- 100
Barley	165- 575
Cucumbers	0- 55
Carrots	43- 130
Corn	100-1,490
Cabbage	23- 452
Eggs	25- 914
Meats	117- 800
Milk	16- 127
Onions	36-1,780
Oats	200-1,000
Potatoes	24- 94
Peas	38- 204
Rye	87- 380
Rutabagas	172- 600
Tomatoes	0- 122
Wheat	115-1,880
Water	0- 33

Lettuce and turnip greens have been reported to contain selenium in amounts

ranging from 0.3 to 150 p.p.m. Of the food listed, cereals are of special importance because of the quantities raised and their wide distribution to the markets of the world. Next in importance are the food concentrates such as egg powder, milk powder, cheese, gluten, and the flesh of chickens, cattle, hogs, and other flesh-producing animals. Fruits become involved because of the use of sprays. Vegetables and fruits both may become involved in newly developed irrigation districts. In this country milk from "alkalied" cows contained enough selenium to produce in their nursing young all of the prominent symptoms of selenium poisoning. Suckling pigs also became "alkalied" and lost their hair because of the transmission of selenium through the milk. The placenta is capable of transmitting selenium to the fetus so that the young are born with selenium in their tissues. This increases during the nursing period.

The future of seleniferous lands is a problem. The ability of animals to detect toxic vegetation would seem to indicate that one solution at least would be to let affected areas revert to natural prairie land to be used only for open grazing.

The human aspect of selenium poisoning is less well known. Only two efforts have been made thus far in determining to what extent humans may be involved. The awakening consciousness that the human being as well as the farm animal has an economic value; that human problems as well as agricultural ones demand concerted action, is making it highly desirable, if not imperative, that research laboratories and public health agencies make every effort to bring about a clearer understanding of the questions involved.

Only a few cases of injury to man have been definitely determined. The only studies made on humans have shown the presence in the urine of

selenium in quantities equal to that found in the urine of toxic animals. To deny the existence of selenium poisoning as such in these individuals because studies have not shown a symptom pathognomonic of selenium poisoning is assuming a very conservative attitude. Byers, in his Mexican studies, was not willing to commit himself by stating that the evident ill-health of the inhabitants was due to the selenium content of their food and concluded that the question was problematical and worthy of study.

By the investigators who have studied the selenium problem the most thoroughly, the public health aspect of the situation is limited exclusively to the affected areas. It should not be overlooked, however, that the largest part of the world's wheat is grown in semi-arid soils where selenium, if present, would tend to remain and perhaps even accumulate in the soil. Of equal importance is the contamination of food material by seleniferous sprays. Byers and Knight state that while it is true quantities of toxic foodstuffs have been produced and marketed, and that unless preventive measures are taken they will continue to be produced and marketed, no serious concern need be felt except in the areas concerned. In this connection it should not be forgotten that toxic areas in this country have been found in some 14 states and that the investigation of other areas is not yet complete.

Others tend to minimize the public health aspects of the problem by stating that in the general market it is impossible that any serious concentration of toxic food is likely to reach any individual. It is freely admitted, however, that "there exists the possibility that the health of the public as well as that of livestock might be involved since selenium bearing foods grown upon seleniferous soils also enters human dietary."

There is no doubt that the selenium problem is one of such magnitude that it cannot be ignored. It presents to research people and public health authorities a great responsibility. Not only should food supplies derived directly or indirectly from seleniferous areas be scrutinized, but special emphasis should be placed upon the protein concentrates or derivatives of those foods. Foods that have been sprayed with selenium-containing sprays should also be given consideration and soils catching the spray run off should be studied from the standpoint of the building up of seleniferous soils. Foods raised on soils exposed to the wash-off from certain mines and on soils in proximity to smelters should also be regarded in the same light. A new and equally important aspect of the problem is the strong likelihood of increasing seleniferous areas in irrigation districts using water containing selenium. This problem is of more than theoretical interest in the lower Colorado River since Byers demonstrated the presence of selenium in appreciable quantities. This same authority is responsible for the statement that "irrigation does not diminish the effect of selenium in plants when the water contains selenium." Furthermore, the use of such water for irrigation purposes in arid regions where the rate of evaporation is high may actually build up new seleniferous areas. Those considerations mentioned by Marcovitch in connection with fluorine should be considered here also. Food raised in these districts should also be studied from the standpoint of an increasing content of selenium. Last but not least is the consideration that should be given the worker in those industries where selenium is either used or is present as a by-product.

No more fitting conclusion can be given to this review than the following statement made by Smith, Franke, and Westfall:

More detailed information regarding the sources of selenium; accurate knowledge concerning the quantitative relationship between the selenium excreted to that ingested and stored in the tissues; more intimate knowledge concerning the chemical nature of the compound or compounds of selenium occurring in foodstuffs, and a thorough knowledge of the fate of these compounds in the body, are some phases of the general problem requiring solution before its public health significance can be fully appreciated.

To this must be added, of course, the dangers that may accrue in developing new seleniferous areas through spray processes, irrigation, and industrial practices and the marketing of foods raised in such areas; foods subjected to seleniferous sprays and the various concentrates made from these foods.

BIBLIOGRAPHY

1. Editorial. *J.A.M.A.*, 110:1840, 1938.
2. Byers, H. G. *J.A.M.A.*, 110:1128, 1938.
3. Byers, H. G., Miller, J. T., Williams, K. T., and Lakin, H. W. U. S. Dept. of Agric. *Tech. Bull.* 601, 1938.
4. Dudley, H. C. *Pub. Health Rep.*, 53:94, 1938.
5. Dudley, H. C. *Pub. Health Rep.*, 53:281, 1938.
6. Franke, K. W., and Painter, E. P. *Cereal Chemist*, 15:1, 1938.
7. Hoskins, W. M. *Science*, 87:46, 1938.
8. Moxon, A. L. *Science*, 88:81, 1938.
9. Moxon, A. L., and Poley, W. E. *Poultry Science*, 17:11, 1938.
10. Trelease, S. F. *Science*, 87:70, 1938.
11. Editorial. *J.A.M.A.*, 109:2144, 1937.
12. Editorial. *J.A.M.A.*, 108:210, 1937.
13. Byers, H. G. *Indust. & Eng. Chem.*, 29:1200, 1937.
14. Coleman, W. C., and McCrosky, C. R. *J. Am. Chem. Soc.*, 59:1458, 1937.
15. Coleman, W. C., and McCrosky, C. R. *Indust. & Eng. Chem., Anal. Ed.*, 9:431, 1937.
16. Dudley, H. C. *Am. J. Hyg.*, 24:227, 1936.
17. Dudley, H. C., and Miller, J. W. *Pub. Health Rep.*, 52:1217, 1937.
18. Ellis, M. M., Motley, H. L., Ellis, M. D., and Jones, R. O. *Proc. Soc. Exper. Biol. & Med.*, 36:519, 1937.
19. Franke, K. W., and Moxon, A. L. *J. Pharmacol. & Exper. Therap.*, 61:89, 1937.
20. Franke, K. W., and Painter, E. P. *Indust. & Eng. Chem.*, 29:591, 1937.
21. Ljung, H. A. *Indust. & Eng. Chem., Anal. Ed.*, 9:328, 1937.
22. Motley, H. L., Ellis, M. M., and Ellis, M. D. *J.A.M.A.*, 109:1718, 1937.
23. Moxon, A. L. *South Dakota Agri. Exper. Sta. Bull.* 311, 1937.
24. Poley, W. E., Moxon, A. L., and Franke, K. W. *Poultry Science*, 16:219, 1937.
25. Smith, M. I., Stohman, E. F., and Lillie, R. D. *J. Pharmacol.*, 60:449, 1937.
26. Smith, M. I., Westfall, B. B., and Stohman, E. F. *Pub. Health Rep.*, 52:1171, 1937.
27. Smith, M. I., Westfall, B. B., and Stohman, E. F. *J. Pharmacol.*, 60:119, 1937.
28. Smith, M. I., and Westfall, B. B. *Pub. Health Rep.*, 52:1375, 1937.
29. Twomey, A. C., and Twomey, S. J. *Science*, 83:470, 1937.
30. Barondes, R. de R. *Am. J. Digest Dis. & Nutrition*, 3:330, 1936.
31. Beath, O. A., and Gilbert, C. S. *Science*, 83:104, 1936.
32. Beath, O. A., and Gilbert, C. S. *Science*, 84:484, 1936.
33. Byers, H. G., Williams, K. T., and Lakin, H. W. *Indust. & Eng. Chem.*, 28:821, 1936.
34. Dudley, H. C. *Am. J. Hyg.*, 23:169, 1936.
35. Dudley, H. C. *Am. J. Hyg.*, 23:181, 1936.
36. Dudley, H. C. *Am. J. Hyg.*, 24:227, 1936.
37. Durrell, L. W., and Newson, I. E. *Colorado Sta. Exper. Bull.* 429, 1936.
38. Franke, K. W., and Moxon, A. L. *J. Pharmacol. & Exper. Therap.*, 58:454, 1936.
39. Franke, K. W., and Potter, V. R. *J. Nutrition*, 12:205, 1936.
40. Franke, K. W., and Potter, V. R. *Science*, 83:330, 1936.
41. Franke, K. W., Moxon, A. L., Poley, W. E., and Tully, W. C. *Anal. Rec.*, 65:15, 1936.
42. Franke, K. W., and Painter, E. P. *Cereal Chemist*, 13:67, 1936.
43. Franke, K. W., and Tulley, W. C. *Poultry Science*, 15:316, 1936.
44. Hurd-Karrer, A. M. *Science*, 84:252, 1936.
45. Painter, E. P., and Franke, K. W. *Cereal Chemist*, 13:172, 1936.
46. Robinson, W. O. *Indust. & Eng. Chem.*, 28:736, 1936.
47. Schneider, H. A. *Science*, 83:32, 1936.
48. Smith, M. I., Franke, K. W., and Westfall, B. B. *Pub. Health Rep.*, 51:1496, 1936.
49. Stenn, F. *Arch. Path.*, 22:398, 1936.
50. Editorial. *J.A.M.A.*, 106:926, 1936.
51. Editorial. *J.A.M.A.*, 107:134, 1936.
52. Editorial. *J.A.M.A.*, 107:968, 1936.
53. Beath, O. A., Eppson, H. F., and Gilbert, C. S. *Univ. Wyoming Agri. Exper. Sta. Bull.* 206, 1935.
54. Byers, H. G. U. S. Dept. of Agric. *Tech. Bull.* 482.
55. Byers, H. G. *Indust. & Eng. Chem.*, 27:902, 1935.
56. Dudley, H. C., and Byers, H. G. *Indust. & Eng. Chem.*, 7:3, 1935.
57. Franke, K. W., and Painter, E. P. *J. Nutrition*, 10:599, 1935.
58. Franke, K. W., and Potter, V. R. *J. Nutrition*, 10:213, 1935.
59. Franke, K. W. *J. Nutrition*, 10:223, 1935.
60. Franke, K. W. *J. Nutrition*, 10:233, 1935.
61. Franke, K. W., and Tully, W. C. *Poultry Science*, 14:273, 1935.
62. Knight, H. G. *J. Assoc. Offic. Agri. Chem.*, 18:103, 1935.
63. Miller, J. T., and Byers, H. G. *Indust. & Eng. Chem.*, 13:456, 1935.
64. Moxon, A. L., and Franke, K. W. *Indust. & Eng. Chem.*, 27:77, 1935.
65. Painter, E. P., and Franke, K. W. *J. Biol. Chem.*, 111:643, 1935.
66. Potter, V., and Elvehjem, C. A. *Biochem. J.*, 30:189, 1936.
67. Tully, W. C., and Franke, K. W. *Poultry Science*, 14:280, 1935.
68. Williams, K. T., and Byers, H. G. *Indust. & Eng. Chem., Anal. Ed.*, 7:431, 1935.
69. Editorial. *J.A.M.A.*, 104:50, 1935.
70. Beath, O. A., Draize, J. H., and Gilbert, C. S. *University Wyoming Agri. Exper. Sta. Bull.* 200, 1934.
71. Franke, K. W. *J. Nutrition*, 8:597, 1934.

72. Franke, K. W. *J. Nutrition*, 8:609, 1934.
73. Franke, K. W., and Potter, V. *J. Nutrition*, 8:615, 1934.
74. Franke, K. W., and Moxon, A. L. *J. Nutrition*, 8:625, 1934.
75. Franke, K. W., Rice, D. D., Johnson, A. G., and Schoening, H. W. *U. S. Dept. Agri. Bull.* 320, 1934.
76. Robinson, W. O., Dudley, H. C., Williams, R. T., and Byers, H. G. *J. Indust. & Eng. Chem., Anal. Ed.*, 6:274, 1934.
77. Tully, W. C., and Franke, K. W. *Poultry Science*, 13:343, 1934.
78. Horn, M. J. *Indust. & Eng. Chem., Anal. Ed.*, 6:34, 1934.
79. Marcovitch, S., Shuey, G. A., and Stanley, W. W. *Univ. Tennessee Agri. Exper. Sta. Bull.* 162, 1937.

Mass Immunization Against Diphtheria with Sordelli's Toxoid and Contact Immunization*

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IN Mexico diphtheria has been more frequent than was believed to be the case in other countries. An average of 1,295 deaths occurred annually from 1931 to 1936. The trend of mortality from this disease has been increasing from 1930 to 1936, as can be seen by the following death rates: 1930-5.4; 1931-6.5; 1932-7.8; 1933-7.4; 1934-7.5; 1935-7.0; 1936-7.6.¹

Probably this is not an apparent increase but a real one, because the trend of most of the other communicable diseases is downward and for this reason it would not be wise to think that in the case of diphtheria the increase is due to better registration. Besides this, the increasing crowding of our rural population into the cities, due to social, political, and economic reasons, and the high percentage of susceptibles to diphtheria in our population, as we shall see later, are two factors that may explain the increase of morbidity and mortality from this disease.

For these two reasons diphtheria is a very important health problem in Mexico. Each year more attention is

given to its control, and research work is now being done to improve methods and technics of control.

Diphtheria has been very prevalent in the past in most countries, and if it is now under control in many places, it is due to the constant and careful preventive measures taken, but as soon as these are relaxed the disease spreads. In some countries the mortality is rising, notably in Germany from 1931 to 1935; in England from 1932 to 1937; Poland from 1929 to 1934.² In some others, like Japan, it is stationary; in the United States and Canada, there have been some outbreaks that caused a number of cases and deaths. For all these reasons diphtheria is a disease that deserves careful and permanent attention from the public health authorities.

The main factor in the control of diphtheria has been active mass immunization and immunization of the contacts of cases. Several products have been used in active immunization, but the one most commonly employed has been Ramon's anatoxin, introduced in 1924.³ This has the disadvantage that several injections are needed and in mass immunization this is a great obstacle to reach the proportion of im-

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munes necessary to protect the herd, since, for several reasons, many do not receive the second or the third doses. Ramon's anatoxin has also the disadvantage that it takes several weeks to induce immunity, and consequently it cannot be used to protect contacts of cases of diphtheria that have been already infected or may be infected within a few days or weeks. For this purpose antitoxin has been used; but the immunity that antitoxin confers lasts only 2 or 3 weeks, and after that the contacts may be still in danger of infection. It is not advisable to repeat the injections of antitoxin for reasons that are well known. What is done at present is to induce active immunity to diphtheria contacts 2 or 3 weeks after the injection of antitoxin. This procedure is not practical because it is necessary to follow up the contacts and to inject them several times.

To avoid the disadvantages found in mass immunization against diphtheria with Ramon's anatoxin and other products which are given in repeated injections, several investigators have tried to induce immunity with a single dose of concentrated and activated toxoids. The alum precipitated and the aluminium hydroxide activated toxoids are the most commonly used. Glenny, Pope, Waddington, and Wallace⁴ proved that the precipitate made by alum in the diphtheria crude toxoid was more antigenic than the latter for the immunization of horses, and this was confirmed in human immunization by Park, by Wells, Graham and Havens. Now the use of this produce is very widespread in the United States, England, Scotland, and other countries. Cumming reported to the Office International d'Hygiene Publique that 85 per cent of the diphtheria immunizations in the United States are made with alum precipitated toxoid.²

Lindes Krom, Lang and Schmith,⁵

and Schmith and Hansen,⁶ activated the acid precipitated toxoid adding aluminium hydroxide ($Al(OH)_3$). This product has been extensively used in Denmark and Argentine. Sordelli modified the original technic for the preparation of the alumina activated toxoid and has reported great success with it for mass immunization.

For the immunization of contacts it would be very important to have a method by which it was possible to induce a rapid and lasting immunity, so that those exposed to infection could be protected immediately, and for a long time. This could be done if it were possible to induce simultaneously the passive and active immunity. This is not possible with antitoxin and Ramon's anatoxin because, as several authors have stated, particularly Rose-nau,⁷ if these two products are injected at the same time or a few hours or days apart, they combine and interfere with one another, nullifying their immunizing properties.

Schmidt and Kjaer, quoted by Leonard and Holm,⁸ observed that toxoid precipitated with acetic and hydrochloric acids do not flocculate with antitoxin; in other words, they have lost their property to combine with antitoxin. Schmith and Hensen, quoted by the same authors,⁸ state that "diluted diphtheria toxine treated with aluminium hydroxide are not stable in their flocculating properties in contact with antitoxin," and conclude from their investigations with alumina activated toxoid that it remains antigenic, notwithstanding that it has lost its combining property.

We observed that Sordelli's toxoid has lost its property of combining with antitoxin, and this gave us the idea that it might be possible to induce simultaneous immunity, active and passive, with Sordelli's toxoid and antitoxin.

This paper is intended to report on the investigations performed in Mexico

by us on mass immunization against diphtheria with Sordelli's toxoid and the simultaneous immunization, active and passive, of the contacts, with Sordelli's toxoid and antitoxin.

We divide the account of our investigation into two parts: the first dealing with mass immunization, and the second with the immunization of contacts.

MASS IMMUNIZATION

We Schick tested 4,309 persons of all ages. Readings were made from the first to the fourth day. We classified as susceptibles all who gave a positive or combined reaction, and as immunes those who gave a negative or pseudo-positive reaction. Three thousand, one hundred and ninety-two, or 74.1 per cent, were susceptibles, the percentage of susceptibles being higher at the lower ages, though 48.8 per cent of those 25 years of age or over were found susceptible. The percentage of adult susceptibles found in Mexico is higher than that found in other countries. The susceptibility to diphtheria of different age groups, as shown by the Schick test, is presented in Table I.

The immunes were not further taken into consideration. The 3,192 susceptibles were divided into 3 age groups.

Group 1 comprises from 0 to 5 years age; group 2, from 6 to 10, and group 3, from 11 years on. Each group was subdivided into 3 subgroups. Those of subgroup I were injected with $\frac{1}{2}$ cc. of Sordelli's toxoid; those of subgroup II with 1 cc., and those of subgroup III with $1\frac{1}{2}$ cc.

The toxoid used was prepared in the Instituto de Higiene of Mexico according to the technic of Schmith modified by Sordelli, briefly described as follows:

From diphtheria toxin of 80 m.l.d. potency was prepared the anatoxin adding 0.4 per cent formalin and storing in the incubator until detoxification. One cc. of the anatoxin protected guinea pigs of 250 to 300 gm. weight against 5 m.l.d. To the anatoxin was added a 20 per cent sulfuric acid solution until a pH of 3.2 to 3.4 was reached. It was left to settle for 20 minutes and then centrifuged 1 hour at 3,500 r.p.m. The supernatant was discarded and the sediment redissolved in distilled water. To this solution was added NaOH until a pH of 7.6 to 7.8 was reached, and then enough distilled water was added to bring it up to $\frac{1}{10}$ the original volume. Sterilization was done by filtration through Berkefeld candle and finally aluminium hydroxide (Al

TABLE I

Susceptibility to Diphtheria at Different Ages, of 4,309 Individuals, as Shown by the Schick Test

Age Groups	Number Studied	Number Positives	Per cent	Number Negatives	Per cent
0 to 1 year	285	267	93.68	18	6.32
2 years	250	236	94.40	14	5.60
3 "	270	245	90.74	25	9.26
4 "	282	242	85.81	40	14.19
5 "	290	244	84.14	46	15.86
6 "	313	253	80.83	60	19.17
7 "	432	357	82.64	75	17.36
8 "	409	291	71.15	118	28.85
9 "	312	210	67.31	102	32.69
10 to 14 "	1,169	684	58.51	485	41.49
15 to 24 "	174	103	59.19	71	40.80
25 on	123	60	48.78	63	51.22
Total	4,309	3,192	74.08	1,117	25.92

TABLE II

Per Cent of Negative Schick Reactors in Susceptibles Injected with Sordelli's Toxoid According to Age and Dose

From 20 to 307 Days Between Toxoid Injection and Schick Test

Age Groups (1)	$\frac{1}{2}$ cc.				1 cc.				$1\frac{1}{2}$ cc.			
	No. Studied (2)	No. Negative (3)	Per cent Negative (4)	σ B (5)	No. Studied (6)	No. Negative (7)	Per cent Negative (8)	σ B (9)	No. Studied (10)	No. Negative (11)	Per cent Negative (12)	σ B (13)
6 months to 5 years	117	68	58.12	5.3	351	245	68.80	3.6	288	218	75.69	4.4
6 to 10 years	27	20	74.07	14.0	381	272	71.39	3.6	337	285	84.75	4.6
11 and over	7	5	71.43	27.4	162	136	83.95	6.6	132	108	81.82	7.1
All ages	151	93	61.60	5.02	894	653	73.00	2.44	757	611	80.70	2.93

(OH)₃) was added in the proportion of 4 mg. per cc.

The Sordelli's toxoid was prepared by G. Varela and Aguirre Colorado.

The lots of toxoid we used had from 10 to 15 L_t units per cc. Tests were always made for potency, sterility, and innocuity according to Government Standards.

Of the 3,192 susceptibles injected with toxoid, 1,802 were retested at intervals of 20 to 307 days, and 1,357, or 75.3 per cent, gave a negative reaction or, in other words, became successfully immunized; but it seems that the percentage of immunizations varied with the age of the persons injected, the dose employed and the time interval between injection and test, although

the differences observed are not statistically significant.

The percentage of persons successfully immunized was greater among the higher ages, with the larger doses, and when the interval between injection and test was longer. The first statement is based on the figures in column 8 of Table II, and these figures were chosen because they have the lower probable errors. The second statement is based on the figures in the last line of Tables II and III; and the third on figures in column 8 and 2d, 3d and 4th lines of Table III.

On the average, a little more than 80 per cent of susceptibles injected with $1\frac{1}{2}$ cc. (15 to 22.5 L_t) of Sordelli's toxoid became immune as shown by

TABLE III

Per Cent of Negative Schick Reactors in Susceptibles Injected with Sordelli's Toxoid, According to Dose and Intervals Between Toxoid Injection and Schick Test

Days Between Toxoid Injection and Schick Test (1)	All Ages											
	$\frac{1}{2}$ cc.				1 cc.				$1\frac{1}{2}$ cc.			
	No. Studied (2)	No. Negative (3)	Per cent Negative (4)	σ B (5)	No. Studied (6)	No. Negative (7)	Per cent Negative (8)	σ B (9)	No. Studied (10)	No. Negative (11)	Per cent Negative (12)	σ B (13)
20 to 30	4	3	75.00	37.50	28	21	75.00	14.15	126	105	83.33	7.43
31 to 45	37	13	35.13	5.76	242	124	51.24	3.29	156	146	93.59	7.49
46 to 90	32	16	50.00	8.83	152	108	71.05	5.76	58	39	67.24	8.83
91 to 307	78	61	78.21	8.86	472	400	84.75	3.90	417	321	76.98	3.77
20 to 307	151	93	61.59	5.01	894	653	73.04	2.44	757	611	80.71	2.93

the Schick test, 73 per cent of the injected with 1 cc. (10 to 15 L_r) and 61 per cent of those injected with $\frac{1}{2}$ cc. (5 to 7.5 L_r). These percentages are reached 20 days after the injection and are also found after 307 days.

The reactions observed in persons injected with Sordelli's toxoid were divided in local and general, and the locals in mild, moderate and strong.

We considered as strong local reactions those in which inflammatory signs were present at the site of the injections in an area of about 5 cm. in its longer diameter; moderate, when the area of inflammation was less than 5 and more than 2 cm. in diameter, and pain moderate; and mild reaction, when the area of inflammation was limited to less than 2 cm. in diameter and pain absent.

An average of 50 per cent had a local reaction, and 13 per cent a general reaction. Both reactions were a little more frequent with the larger doses, but no significant difference was observed with the age.

The local reactions were mild in 30.3 per cent, moderate in 48.2 and strong in 19.3.

The general reactions were always mild, consisting of a moderate rise of the temperature for a few hours, with the exception of one case in which an urticarial exanthem was observed.

We also observed the formation of abscesses at the site of the injection in 8 cases among the 3,192 persons injected with Sordelli's toxoid; but the evidence pointed to careless technic in making the injection as the cause. *Staphylococcus pyogenes* was found in the pus obtained by aseptic puncture of 4 abscesses.

THE IMMUNIZATION OF CONTACTS

As said, I conceived the idea that it could be possible to induce simultaneously passive and active immunity against diphtheria, with antitoxin and Sordelli's toxoid, because I observed that

this toxoid had lost its property to combine with antitoxin. To prove this idea we performed laboratory investigations. Two lots of several guinea pigs each were injected with appropriate doses of diphtheria antitoxin and Sordelli's toxoid, at the same time but at different sites. To test the production of passive immunity, the guinea pigs of the first lot were injected with 5 m.l.d. of diphtheria toxin 24 hours after the injection of antitoxin and toxoid. Two normal guinea pigs were also injected with diphtheria toxin as controls.

Within 3 days after the injection of the toxin, the controls died, but the guinea pigs injected previously with antitoxin and toxoid survived and did not show signs of illness during the following month.

In order to test the active immunity induced by the simultaneous injection of toxoid and antitoxin, the second lot of guinea pigs were injected with 5 m.l.d. of diphtheria toxin 30 days after the injection of antitoxin and toxoid. Two normal guinea pigs were also injected with toxin, as controls. Within 24 hours after the injection of the toxin, the controls died, but the guinea pigs that had been previously injected with toxoid and antitoxin survived and did not show signs of illness. The protocols of these experiments have been published elsewhere.⁹

From the experiment described we drew the 2 following conclusions:

1. The Sordelli's toxoid and the diphtheria antitoxin confer simultaneous immunity, active and passive, when they are injected at the same time, but at different sites in doses at which the serum confers passive and the toxoid active immunity when injected separately.

2. When Sordelli's toxoid and diphtheria antitoxin are injected at the same time but at different sites, they do not combine *in vivo* and do not interfere with one another.

Based on these 2 conclusions we made investigations in the field and in human beings.

TABLE IV

Schick Reactions Resulting After Simultaneous Injection of Diphtheria Antitoxin and Sordelli's Toxoid in 90 Susceptible Individuals

Ages	Total of Indi- viduals Studied	First Schick 1 to 3 Days After Injection				Second Schick			
		Positive		Negative		1 Month After		2 Months After	
		No.	%	No.	%	Pos. No.	Neg. No.	Pos. No.	Neg. No.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
0 to 4 years	29	..	..	29	100.0	2	8	4	8
5 to 9 "	26	..	..	26	100.0	2	10	4	9
10 to 14 "	12	..	..	12	100.0	..	7	..	4
15 to 20 "	4	..	..	4	100.0	..	1	1	2
20 and over	19	2	10.5	17	89.5	2	10	..	6
Totals	90	2	2.2	88	97.8	6	36	9	29
Total Negative React. 81.2 %									

The investigations were made among contacts of diphtheria cases and carriers. The contacts were Schick tested; those who gave a negative reaction (immunes) were not taken into consideration. The Schick positives (susceptibles) were injected with 1,000 to 1,500 A.U. of diphtheria antitoxin and with 1 cc. to 1½ cc. of Sordelli's toxoid. These products were injected subcutaneously, at different sites, but at the same time.

Within 24 to 72 hours after the injection of toxoid and antitoxin a second Schick test was made to see if passive immunity was established and 1 or 2 months later a third Schick test was made to see if active immunity was induced.

In accordance with the plan outlined 90 susceptible contacts of diphtheria cases or carriers were injected with Sordelli's toxoid and diphtheria antitoxin, and Schick tested before and after the injection: 88, or 97.8 per cent gave a negative Schick test within 24 to 72 hours after they had been injected, and 2, or 2.2 per cent, gave a positive reaction. It must be said that the 2 persons who remained susceptible were adults injected for some reason with

only 900 A.U., a dose which is insufficient, as we know.

Of the 90 susceptible contacts injected with toxoid and antitoxin, and Schick tested before and after the injection, only in 80 was a third Schick test made 1 or 2 months after the injection. Among 42, the Schick test made 1 month after the injection, 36 gave a negative reaction and 6 a positive one. In 38 the test was made 2 months after the injection—29 gave a negative reaction and 9 a positive. Taking into consideration the Schick tests made 1 month and 2 months after the injection of toxoid and antitoxin, the result was negative in 82.2 per cent of the contacts injected (see Table IV).

In 132 persons injected with toxoid and antitoxin it was possible to observe the reactions that followed with injection of these products.

In 96, or 72.7 per cent, a local reaction was observed, of which 18, or 13.5 per cent, were strong; 26, or 19.7 per cent, were moderate; and 52, or 39.4 per cent, were mild. In 34, or 27.5 per cent, a general reaction was observed (see Table V).

The criterion followed to classify the reactions was the same as stated above.

TABLE V

Frequency of Local and General Reactions Following Simultaneous, Active and Passive, Immunization

Ages	Total of Individuals Injected	Local Reactions Variety					General Reactions	
		Number	Strong	Moderate	Mild	None	Pos. Number	Neg. Number
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1 year	10	9	3	3	3	1	5	5
2 years	12	8	..	..	8	4	5	7
3 "	10	7	2	2	3	3	4	6
4 "	12	10	4	2	4	2	5	7
5 "	7	6	3	1	2	1	..	7
6 "	9	7	..	1	6	2	4	5
7 "	9	6	..	1	5	3	1	8
8 "	7	5	..	1	4	2	1	6
9 "	7	5	2	1	2	2	1	6
10 "	8	6	2	2	2	2	2	6
11 "	2	2	..	1	1	..	..	2
12 "	5	4	..	2	2	1	1	4
13 "	1	..	..	..	..	1	..	1
14 "	3	1	1	..	..	2	..	3
15-24 years	8	6	..	4	2	2	1	7
25 and over	22	14	1	5	8	8	4	18
Totals	132	96	18	26	52	36	34	98
Percentages	100.0	72.7	13.6	19.7	39.4	27.3	25.7	74.3

SUMMARY AND CONCLUSIONS

We have described the technics and methods followed in mass immunization against diphtheria with Sordelli's toxoid. The percentage of persons successfully immunized after the injection of $\frac{1}{2}$ cc., 1cc. or $1\frac{1}{2}$ cc. of toxoid has been specified. The correlation of the doses of the product, age of the persons injected, and time between the injection and immunity test, with the percentage of successful immunizations have been studied. The frequency of local or general reactions after the injection of Sordelli's toxoid and their intensity were observed.

We have also described our studies as to the simultaneous immunization, active and passive, of the susceptible contacts of diphtheria cases and carriers, with Sordelli's toxoid and anti-toxin and results obtained.

From these studies we draw the following conclusions:

1. The Sordelli's toxoid, acid precipitated

and aluminium hydroxide activated, when injected in a single dose of $1\frac{1}{2}$ cc., having 10 to 15 L_t units per cc., confers immunity to an average of 80 per cent of the susceptibles of all ages so injected.

2. The immunity induced with Sordelli's toxoid is already acquired 20 days after the injection and remains at the same level at least 307 days later, according with our observations.

3. The higher proportions of successful immunizations with Sordelli's toxoid are observed in the older age groups. Probably this is an indication that the doses must be higher for the preschool age children than for school age children and adults.

4. Local reactions at the site of the injection of toxoid were observed in about 50 per cent of the persons injected, and general reactions in 13 per cent; but both reactions were always mild and transitory. They do not contraindicate the use of Sordelli's toxoid.

5. We believe that Sordelli's toxoid is a product that can be used with advantage in mass immunization against diphtheria since about 15 L_t units in a single injection are enough to immunize 80 per cent of the persons injected; but we think that it would be convenient to prepare and use more potent toxoids, probably with not less than 30 L_t units

per cc., in order to obtain higher proportions of successful immunizations.

6. Simultaneous immunization, active and passive, against diphtheria, can be induced with Sordelli's toxoid and diphtheria antitoxin, if these products are injected subcutaneously, but at different sites, in doses in which the toxoid confers active and the antitoxin passive immunity when used separately.

7. We believe that the simultaneous immunization, active and passive, with Sordelli's toxoid and antitoxin should be the method of election for the immunization of susceptible contacts with diphtheria cases or carriers, since with this method they will be protected immediately and for a long time, or permanently. Probably alum precipitated toxoid may be used as well as Sordelli's toxoid for this purpose.

REFERENCES

1. Leon, Alberto P. Informe de estudios y trabajos sobre-epidemiología y profilaxis de las enfermedades transmisibles. *Bol. Epide. D.S.P. México* I, 12:245, 1938.
2. Situation épidémiologique de la diphtérie et vaccination antidiphtérique dans les divers pays. *Bul. Office Internat. d'hyg. pub.*, XXVIII, Sup. au 2:1-106 (Feb.), 1936.
3. Ramon, 1924. *Ann. Inst. Pasteur*, XXXVIII, 1.
4. Pope, Waddington and Wallace. *J. Path. & Bact.*, XXIX, 38, 1926.
5. Lindes Krom, Lang and Schmith. *Kolloid Ztschr.*, LI, 152, 1930.
6. Schmith and Hansen. *Biochem. Ztschr.*, CCXXVIII, 263, 1930.
7. Rosenau, M. H. *Preventive Medicine and Hygiene*. 6th ed. p. 68.
8. Leonard, G. F., and Holm, A. Purification of Diphtheria-Toxoid. *J. Infect. Dis.*, LII, 12:377 (Dec.), 1933.
9. Leon, Alberto, P., Escarza, F., and Lara, N. J. La inmunización simultánea antidiftérica, pasiva y activa, en la protección de los contactos de enfermos de Difteria medicina II, 1:1-18 (junio), 1938.

Administration of Laws for the Prevention and Control of Occupational Diseases*

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LEGISLATION providing for the compensation for and prevention of occupational diseases has been the result of a definite economic need in our present-day industrial relations. In the same manner that Workmen's Compensation Acts were necessary to provide some new method to adjust disputes between employer and employee as to the liability of an employer for accidental injuries, so occupational disease compensation acts have become essential to provide the medium for the settlement of claims for occupational disease injuries. Industrialists today accept the obligation imposed upon industry to provide compensation for injuries to their employees arising out of and in the course of employment, no matter whether they are caused by occupational disease or accidental means.

One of the most serious problems that have arisen in connection with the administration of the Workmen's Compensation Acts has been the problem of disease caused or aggravated by accidental injuries. There had already de-

veloped the tendency for these laws to be administered as general health insurance laws, and this tendency became even more acute with the adoption of laws providing compensation for occupational disease injuries. The primary purpose of the compensation statutes is to compensate only those injuries that are characteristic of and peculiar to the employment where the hazard of injury occurs. If there were no such limitation as to the scope of the compensation acts, they would inevitably be administered as general health insurance laws, which was certainly not the intention or purpose sought to be accomplished by their enactment.

The American Public Health Association has had as one of its major interests the subject of industrial hygiene, and your officers, committees, and members are to be commended for the part the Association has played in the protection of the health of workers engaged in trade and exposed to the hazards of industrial disease. You have tendered your assistance to compensation commissions and legislative committees in the draft and preparation of occupational disease laws that were later enacted, and your As-

* Read before the Industrial Hygiene Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

sociation is now concerned with the administration of these laws. Many perplexing problems have already arisen and will continue to arise in the course of this administration, and the continued assistance and interest of your Association is essential in order for this administration to be successful.

In the United States occupational disease compensation laws have been of comparatively recent enactment; the States of California and Wisconsin enacted such laws in 1919; the State of New Jersey in 1924; North Dakota in 1925; Minnesota and Connecticut in 1929; and the remaining 15 states have enacted their laws since 1930.* During this period public hysteria developed about the subject of occupational diseases in industry. I do not mean to be critical of this fact, because it has served to emphasize an industrial problem which should have received legislative attention. However, one of the results of this hysteria has been the hasty enactment of ill-advised laws, whose provisions have led to difficulties of administration and the occasion of unfortunate industrial conditions that might have been avoided by more careful supervision of the legislative programs. The experience in the administration of many of these laws has not extended over a sufficient period of time to appraise properly their merits or demerits. It is to be regretted that this legislation has not been more uniform in certain of its aspects, although future amendments may tend toward uniformity and remove some of the inequities that at present exist. None of the laws so adopted are perfect; many of their provisions are objectionable; and, in

the course of their administration, there have developed and will continue to develop problems that could not have been foreseen at the time of their enactment. In every state questions have arisen, making necessary the judicial construction of these laws in order to determine the liabilities of employers and the benefits granted to claimants thereby.

As typical of the confusion that has arisen with respect to certain of these laws, it is interesting to review certain cases wherein judicial interpretation was essential in order to determine the scope of the laws so enacted.

You are all familiar with the type of occupational disease law that provides what is known as "general coverage" for all occupational disease injuries. These laws do not schedule or classify the diseases that are compensable, but purport to make compensable any and all occupational diseases. As an example, consider the following provisions of the laws of the States of New York, Connecticut, and Illinois.

The New York Workmen's Compensation Act was originally amended to compensate a scheduled list of occupational diseases. By the Acts of 1935, Chapter 254, the following was added to the schedule: "Item 28. Any and all occupational diseases." The law itself does not define the term "occupational disease," and you will readily recognize the need for judicial interpretation of this term in order to determine the scope of the law.

The Connecticut Compensation Act was amended in 1927 to provide compensation for accidental injuries and "occupational disease as herein defined." The Act contains the following definition of occupational disease:

The words "occupational disease" shall mean a disease peculiar to the occupation in which the employee was engaged and due to causes in excess of the ordinary hazards of employment as such.

* Delaware—1937
Illinois—1936
Indiana—1937
Kentucky—1934
Massachusetts—1932
Michigan—1937
Missouri—1931

Nebraska—1935
New York—1930
North Carolina—1935
Ohio—1931
Pennsylvania—1937
Rhode Island—1936
Washington—1937
West Virginia—1935

The occupational disease law adopted by the State of Illinois in 1936 contains the following definition of the term "occupational disease."

The term "occupational disease" means a disease arising out of and in the course of employment. Ordinary diseases of life to which the general public is exposed outside of the employment shall not be compensable, except where the said diseases follow as an incident of an occupational disease as defined in this section.

What is the meaning of the term "occupational disease" as set forth in these statutes and what diseases that arise out of and in the course of employment are thereby made compensable?

It is interesting to note the judicial interpretation of the courts construing the term "occupational disease" and defining the scope of the law granting compensation therefor.

The case of *Goldberg v. 954 Marcy Corporation*, reported 12 N. E. Rep. (2nd) at page 311, involved an appeal from the action of the Appellate Division, sustaining an award granted by the New York Compensation Board to the claimant for an alleged occupational disease injury. The duties of the claimant required her to sell tickets for a motion picture theatre in a small sidewalk booth which was heated by an electric heater. Her claim set forth that her legs became weakened by the heat and that on her way to the doctor's office for medical attention, she fell and sustained a fracture of the ankle. I quote the following averments of her claim:

My condition was caused by the electric heater in the cash box. It drew the blood out of my feet and caused blotches and veins to come out, making my feet weak.

The referee awarded compensation on the theory that the injury sustained was both an accident and an occupational disease. The Workmen's Compensation Board sustained this finding

on appeal, which was likewise affirmed by the Appellate Division. The New York Court of Appeals, in the case cited above, affirmed the award on the ground that the plaintiff had suffered accidental injury arising out of and in the course of her employment and, in the course of its opinion, in refusing to affirm the appeal on the ground that the claimant had suffered an occupational disease, said:

An occupational disease is one which results from the nature of the employment, and by nature is meant, not those conditions brought about by the failure of the employer to furnish a safe place to work, but conditions to which all employees of a class are subject, and which produce the disease as a natural incident of a particular occupation, and attach to that occupation a hazard which distinguishes it from the usual run of occupations and is in excess of the hazard attending employment in general. Thus compensation is restricted to disease resulting from the ordinary and generally recognized risks incident to a particular employment, and usually from working therein over a somewhat extended period. Such disease is not the equivalent of a disease resulting from the general risks and hazards common to every individual regardless of the employment in which he is engaged.

It is a fact that today, in New York State under the present law, there are pending claims for such diseases as asthma, tuberculosis, pneumonia, colds, bronchitis, and other human ills not peculiar to or characteristic of the trade or employment wherein the claimant is engaged. I do not mean to imply that compensation will be awarded for all such cases and express the hope that the New York statute will never be construed to provide general health insurance for employees. However, there is always present the danger of awards for disease injuries that are not truly occupational in their nature.

A case that arose in connection with the construction of the Connecticut statute is that of *Madeo v. I. Dibner & Bro., Inc.* (1936), 186 Atl. 616. There the claimant contracted pul-

monary tuberculosis while employed in a dress factory. In denying compensation, the court, referring to the definition quoted above, said:

To award compensation to the claimant in this case would be to go against the legislative intent emphasized in the amendment of 1927 and to violate the statute as it has since stood.

The Illinois statute above cited became effective in 1936, and to date there does not seem to be any reported opinion wherein the meaning of the term "occupational disease" has been judicially construed. However, there are claims now pending under this statute for many of the common ills of life, not peculiar to any particular occupation, such as "pneumonia, flat feet, bronchitis, etc." It is inevitable that cases involving such diseases will be passed upon by the courts to determine whether or not they are compensable under the statute.

Recognizing the difficulties of administration that are caused by the inherent defects in these laws, I would like to discuss certain of their administrative provisions that are of particular interest to your Association. These subjects relate to provisions for the determination of occupational diseases and the extent of disability arising therefrom, together with provisions for control and prevention.

- I. Provisions for the creation of Medical Boards or the appointment of medical examiners, defining their functions.
 1. To advise the administrative agency whether or not the claimant is suffering from the occupational disease for which compensation is claimed.
 2. To determine the degree of disability caused by the occupational disease.
- II. Provisions for the establishment of Bureaus of Industrial Hygiene, defining their functions.
 1. Maintenance of an occupational disease reporting system.
 2. Establishment of rules and regulations for the control and prevention of occupational diseases.

3. Maintenance of a factory inspection service.

PROVISIONS FOR THE CREATION OF MEDICAL BOARDS OR THE APPOINTMENT OF MEDICAL EXAMINERS

The adoption of compensatory legislation makes necessary the delegation to some administrative agency of the power to determine whether or not the claimant is suffering from an occupational disease, and the extent of disability arising therefrom. In many occupational disease claims the medical testimony offered by the claimant and the employer will be controverted and expert medical evidence that is highly technical will be offered on behalf of the contesting litigants with resulting confusion and uncertainty in the minds of the agency charged with the administration of the law. The fees payable to expert witnesses are substantial and the parties litigant may, in given instances, expend exorbitant sums in order to accomplish successful results. The employee, unable to finance such trials, is at a distinct disadvantage and may not have available competent medical advice to present his case properly. Under such circumstances, what is the administrative agency to do? To whom may it turn for unprejudiced nonpartisan advice? What agency can be established as representative of the State, to serve the function of determining these all-important medical questions upon which the award or denial of compensation will depend? An answer to this query has been found in many of the occupational disease compensation acts, wherein provisions have been made for the appointment, either of a medical board, or of special medical examiners.

A medical board, composed of competent, impartial physicians, representing the State, disinterested as a party in the proceeding, benefitting by its continued experience in handling this type of claim, is the best agency to

determine medical questions. In order to accomplish the appointment of a board composed of competent, non-political appointees, it may be well to consider the suggestion that the appointments should be made by the governor of the state from a list of nominees to be submitted by the dean or deans of the medical departments of state universities or other medical schools within a given state. There should be the requirement that appointees should have had extensive practice and experience in the diagnosis, treatment and care of occupational diseases. The board should be empowered to make rules regulating its procedure, to contract for laboratory work, to make necessary investigations of working conditions, to provide for the ordering of autopsies, to examine claimants, and to determine all medical issues presented by the claim. All claims involving occupational diseases should be referred to this board for investigation, hearing, and report, which report, when completed, should be filed in the record of the case. At hearings before the board, either party should be given the privilege of offering testimony of its own doctors or such other witnesses as they may desire, and the further privilege of cross-examination of witnesses offered by the other party.

In those states where the findings of the medical board are final, the board should continue its jurisdiction over the case, with the privilege of reopening it at any time it elected to do so, for the purpose of reviewing, reversing, or modifying its decision in such manner as it deems proper. In those jurisdictions where the board serves solely in the capacity of advising the administrative agency, its members should offer testimony as to their findings before the administrative agency and be subject to examination and cross-examination by the parties litigant.

FUNCTIONS OF MEDICAL BOARDS OR MEDICAL EXAMINERS

1. To advise the administrative agency whether or not the claimant is suffering from the occupational disease for which compensation is claimed—

Upon the filing of a claim for occupational disease compensation, the claimant should be required to submit to such medical examinations as the medical board deems necessary or proper to determine the existence of injury and the extent of disability from which the claimant is suffering. In the event that the claimant refuses to subject himself to such examination, the payment of compensation should be suspended until he does submit. Broad powers should be granted to study the condition of the patient over such period of time and under such conditions as are necessary for the proper determination of injury. Either party litigant should have the privilege of offering to the medical board the testimony of its own medical advisers, so that the right of each party to present its own evidence would be retained. The witnesses so offered should be subject to examination by the other party and by the individual members of the medical board. The medical records, laboratory and X-ray findings of either party should be offered in evidence and made an official part of the record of the proceedings before the medical board.

Provision is made, under many of the occupational disease laws, for the conduct of autopsies in death cases. Such autopsies may be ordered by the medical board for the purpose of determining the cause of death since, in the case of many of the occupational diseases, an autopsy will afford the best evidence as to whether or not death was caused by the occupational disease for which claim is made. The board should have the power to order such autopsy and should supervise its conduct, with

the privilege to its members to attend and participate in the examination of the decedent. The findings should be certified by the board as a part of the record in the case.

2. To determine the degree of disability caused by the occupational disease—

One of the most difficult factual determinations involved in occupational disease compensation is that of the extent of disability arising from certain occupational diseases. The formulae that have been established in the Workmen's Compensation Acts providing compensation for accidental injuries are not and cannot be made applicable to occupational disease claims. In the case of many of the occupational diseases the medical profession has not yet agreed upon a satisfactory method for the determination of partial disability. In any given case each party litigant could offer its own testimony as to the extent of the injury and the degree of disability that would be in hopeless conflict with the testimony offered by its opponent. It is recognized that this problem is one that can only be solved after extensive experience in the administration of occupational disease laws and the adoption of a satisfactory method, accepted by the medical profession, for the determination of the degree of disability.

In view of the perplexity of the question and the desire to provide the most expeditious method for the determination of the extent of injury and the degree of disability, it is suggested that this function should be served by the medical board, which should be better able to decide these questions.

Of the occupational disease laws now effective, the laws of the States of Connecticut, Delaware, Missouri, Nebraska, and New Jersey make no provision for the appointment of medical boards. In the laws of the other states such provisions are made. The laws

of the States of Massachusetts and Michigan make the diagnosis and opinion of the board upon medical questions binding upon the agency administering the law. In the States of California, Illinois, Indiana, Kentucky, Minnesota, New York, North Carolina, North Dakota, Ohio, Pennsylvania, Rhode Island, Washington, West Virginia, and Wisconsin, provisions are made for medical boards and examining physicians to act in an advisory capacity to the agency administering the law. The importance of medical boards cannot be over-emphasized and it is submitted that the successful administration of occupational disease laws will depend upon the proper determination of medical questions of fact that are involved in these claims.

Is it not reasonable to believe that the most satisfactory determination of medical issues presented by claims arising under these laws could be made by a board of examining physicians? If the determination of these questions is left to lawyers, judges, or other bodies of laymen, each given case will require the parties litigant to educate the administrative agency in the intricacies of the industrial disease for which compensation is sought. There is no agency in the United States whose voice should be more effective for the accomplishment of this result than the American Public Health Association, and it is to be hoped that it will be the policy of your Association to extend its support and coöperation to the state medical agencies that are charged with the administration of these laws.

PROVISIONS FOR THE ESTABLISHMENT
OF BUREAUS OF INDUSTRIAL HYGIENE

There is one phase of the subject of the administration of occupational disease legislation that merits your careful consideration. That is the subject of prevention and the legislative provisions designed for the protection of

employees against the hazards of occupational disease. It is to be regretted that legislation heretofore enacted by the several states has placed primary emphasis upon compensation, while the subject of prevention has not received the attention that has been justified. In most of the states having occupational disease laws the only legislative methods provided for the control and prevention of occupational diseases are found in the health and labor laws, which are not primarily adaptable to the peculiar problems presented by occupational disease hazards. However, in several of the states, there is specific provision in the occupational disease law for the establishment of bureaus of industrial hygiene and a method provided for the adoption of rules and regulations designed for the control of occupational disease hazards. Let us refer briefly to legislative provisions of this type.

Article 4a, section 65, subsection 2 of the Workmen's Compensation Law of New York, effective June 6, 1936, provides as follows:

The industrial commissioner and the industrial board are hereby required to add to the industrial code, as provided in sections twenty-eight and twenty-nine of the Labor Law, effective rules and regulations governing the installation, maintenance and effective operation in all industries and operations wherein silica dust or other harmful dust hazard is present, of approved devices designed to eliminate such harmful dusts and to promulgate such other regulations as will effectively control the incidence of silicosis and similar diseases.

It will be noted that the provisions of this section are mandatory and that the industrial commissioner and the industrial board are required to adopt effective rules and regulations. Pursuant thereto, the New York Industrial Commissioner has proceeded to accomplish the purposes designed by the law. Before the promulgation of proposed rules and regulations, the Commissioner

has instituted surveys for the purpose of studying operating conditions in those industries in New York State where hazards exist, to determine the extent of the hazard and the effect of the proposed rules and regulations upon those industries that will be subject thereto. He has appointed code committees, whose representatives have been chosen from representatives of manufacturers, labor organizations, state departments, manufacturers of protective equipment, and industrial hygienists so that he may have the advantage of the experience and points of view of those who are best informed upon the problems thus presented.

The first code committee made a study of rock drilling and formulated a code for that industry which has since been adopted. A second code committee was appointed to draft a foundry code and that committee is presently engaged in its research. During the present fall and winter it will probably recommend the formal code to the board, which will then be adopted. There are indications of the appointment of other code committees for those industries wherein hazards exist. These code committees conduct public hearings and then promulgate rules and regulations for the protection of workmen in certain specific industries. When adopted, the code becomes law and must be complied with by the particular industries that are subject thereto within the state.

Of similar nature is Section 39 of the California Workmen's Compensation Law, Chapter 586, which provides as follows:

Sec. 39. The commission shall have power, after a hearing had upon its own motion or upon complaint, by general or special orders, rules or regulations, or otherwise:

(1) To declare and prescribe what safety devices, safeguards or other means or methods of protection are well adapted to render the employees of every employment

and place of employment safe as required by law or lawful order.

(2) To fix such reasonable standards and to prescribe, modify and enforce such reasonable orders for the adoption, installation, use, maintenance and operation of safety devices, safeguards and other means or methods of protection, to be as nearly uniform as possible, as may be necessary to carry out all laws and lawful orders relative to the protection of the life and safety of employees in employments and places of employment.

(3) To fix and order such reasonable standards for the construction, repair and maintenance of places of employment as shall render them safe.

These provisions enable the commission to require the installation of protective machinery and equipment or take any other steps that are necessary, in the commission's judgment, for the prevention and control of occupational diseases. It is apparent that provisions of this type are vitally important if the incidence of occupational diseases is to be controlled.

There are also provisions in the health, labor, and compensation laws of all the states that can be administered for the prevention and control of occupational diseases. It would appear to be desirable to assign to one state department or to a board of industrial hygiene the administration of those laws that relate to the protection of employees from the hazard of occupational diseases. Such a board, with trained personnel, could unify the activities of various state departments and eliminate duplication of supervision, inspection, and control that would inevitably result if such duties were undertaken by more than one state department.

FUNCTIONS OF BUREAUS OF INDUSTRIAL HYGIENE

Maintenance of Reporting System—

In most of the industrial states, there is at present no effective system for maintaining reports and classifications of occupational diseases. It is to be

regretted that the importance of this feature has been overlooked by those interested in the subject of industrial hygiene. The maintenance of such a system would be of material value to make known to state officials those industries wherein potential occupational disease hazards exist, so that effective methods for their control could be adopted. Furthermore, the reported diseases could be classified as to extent of disability sustained by the employee, and data could thus be accumulated that would constitute a valuable record for the purpose of determining the effectiveness of the state's program for prevention and the industrial cost occasioned by disease injuries.

Establishment of rules and regulations for the control and prevention of occupational diseases—

This is the most important function that could be served by the bureau of industrial hygiene. Prior to the adoption of rules and regulations extensive surveys and studies should be made of those industries where occupational disease hazards exist, for the purpose of determining the extent of such hazards and the peculiar operating conditions in given plants which gave rise thereto.

After the completion of its survey of given industries, the bureau could then formulate and recommend for adoption rules and regulations for the control of occupational disease hazards therein that they deemed necessary to promulgate an adequate and effective program of control. When adopted, such rules and regulations should have the force and effect of law. They should only become effective after opportunity for full public hearing, so that any industry that might feel aggrieved by their provisions could be heard and have the opportunity to obtain necessary amendments that the bureau might agree were desirable.

Maintenance of Factory Inspection Service—

Under the various state health, labor, and occupational disease laws, factory inspection has been assigned to different state departments for different purposes. For example, factory inspectors of state departments of health are concerned with matters of sanitation; inspectors of state departments of labor are concerned with the compliance of industry with particular labor laws, such as hours of labor; inspectors of the industrial commission administering the Workmen's Compensation Act, are concerned with the compliance of employers with safety provisions of the compensation law. Where inspection service is thus divided among several state departments, the inevitable result will be that one department will adopt the attitude that it will let some other department take care of a certain type of inspection. The bureau of industrial hygiene could unify such factory inspection service as would be necessary to control industrial disease hazards effectively in the industries within the state. With proper inspection service occupational disease hazards would be discovered, called to the attention of the employer, and remedies for the conditions found.

Every effort should be made to assist industry in the solution of objectionable methods of manufacture that may tend to cause occupational disease hazards. There are many industries that do not have the personnel, equipment, or necessary technical information to understand the extent of the disease hazards in their plants or to install effective methods for their control. The department should assist such industries to correct faulty operating conditions, which could be done at a minimum of cost to the state. Experience has indicated that the greatest number of occupational disease hazards are not within the large industrial plants, operated by

companies that are financially able to perfect their methods of control, but do exist in the smaller units of production where capital resources are not available for the necessary engineering control. Such industries would welcome the bureau's assistance to minimize their hazards effectively and, with intelligent direction, many of the existing hazards could be eliminated at a minimum of cost.

CONCLUSION

Occupational disease compensation laws are the result of definite economic need to afford to injured employees adequate compensation for injuries they have sustained during the course of employment. At the time of their enactment employers have been concerned about the additional cost to which they have been subjected, but to date it does not appear that these laws have placed an unjust burden upon industry. It is to be hoped that employers as a group will cooperate in the administration of these laws. It is too early to predict whether or not that administration will be successful, but if they fail to accomplish the purpose for which they are designed, they should fail because of their inherent defects and inequalities, and not because of the attempt by employers to avoid the imposition upon them of costs for compensating injuries resulting from the operations to which their employees have been subjected.

Those of you who have made special studies of occupational diseases know and appreciate the problem that these laws present to industry. We also know from experience that the cost of prevention of injuries, be they caused by accidents or occupational disease, is but a small part of the potential liability imposed by law for compensation. It is good business today for employers to prevent, rather than to compensate occupational disease in-

juries, and I hope that in the future, prevention so that compensation will primary emphasis may be placed upon not be necessary.

DISCUSSION

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EVERYONE doubtless agrees with the ideas presented in Mr. Waters's excellent paper, but there are certain difficulties that we may discuss to advantage. We should keep in mind among other things, that—

1. The successful administration of these laws involves an intimate knowledge of the intricate associations of employment, disease, and disability—and what is of equal importance, the establishment of cause and effect relationships.

2. Many of the difficulties arising thus far have been occasioned by a belief in the fallacy that methods used in reference to accidental injuries were also of use here. The administration of the legal problems of occupational diseases is much more complicated, especially as to etiology, diagnosis, and differential diagnosis.

3. The use of vague and indefinite wording in our terminology and definitions, and in the laws, breeds controversy. We commonly speak of compensation for occupational diseases—*diseases* are not compensable but *disability* is—the theory of the law is that the employee is compensated for disability which incapacitates him for his work. This is but one example of common loose usage.

4. There are and will continue to be (to borrow a phrase from Dr. Nau) “chisellers on both sides.”

There have been many attempts to define the term occupational disease with some fairly good results from these attempts; but we have to remember that whatever definition may seem to be satisfactory medically, must eventually be construed by the courts. The language of the court in *Goldberg vs. 954 Marcy Corporation* hardly leaves room for doubt as to what is legally meant by the term “occupational dis-

ease.” Of course there would be no necessity for such construction where the so-called schedule system of naming the diseases is in effect.

I am in hearty agreement regarding the suggestion of the appointment of medical boards, especially in reference to the *competency, impartiality, and non-political affiliations* of the personnel composing them. Let us not however, overlook the fact that such men are unusual, and furthermore it should be emphasized that the tenure of office should be secure and the financial consideration commensurate.

The technical problems assignable to a medical board are obviously of such nature that they cannot be appropriately handled by non-medical persons. You will recall that Kessler made some statement such as this in his book *Accidental Injuries* in 1931.

The industrial hygiene bureaus have done very effective work in the several states. A reporting system would be of tremendous importance to the industrial epidemiologist, but we must first convince the employer that he will not be penalized if he reports his cases regularly.

Since the time is far too short for the adequate and detailed discussion which Mr. Waters's excellent paper deserves, may I make the following suggestions for the thoughtful consideration of the officers and the Section Council:

1. The advisability of the creation of a medical board committee especially for the

purpose of studying the functions of medical boards and supplying a list of qualified physicians in the various states

2. The advisability of the creation of a legislative committee for the purpose of advisory work in reference to the formation and administration of laws and codes.

Legislators, administrators, and allied workers need adequate professional

advice and guidance. It is time that we threw off our reaction of shyness to the important medico legal phases of this question. Surely no other group has been so close to the various developments in this field and certainly we have a definite responsibility to the public to make our knowledge and experience readily available.

Water-Borne Outbreak of *Brucella Melitensis* Infection

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AN outbreak of at least 80 cases of brucellosis with 1 death occurred on the campus of Michigan State College, East Lansing, during December, 1938, and January, 1939. All persons attacked were either students in bacteriology or were associated with the bacteriology building during December. In the basement of this building there is a laboratory devoted to the study of brucella organisms and the production of "brucellin" and other materials for diagnosis and treatment of brucella infection. Prior to February 4, on which date the authors were requested to participate in the investigation, it had been demonstrated by the college authorities that several persons were infected with *Brucella melitensis*, giving positive blood cultures.

DIAGNOSIS

The majority of patients gave a his-

tory of an onset with chills, severe headache, and intermittent fever, followed in a few days by increasing weakness, general myalgia, anorexia, insomnia, nausea, constipation, high fever, and delirium. In several there was a particularly troublesome bronchitis resembling that associated with influenza. There were some subclinical or latent cases with a history of only transitory malaise or no symptoms at all, discovered only by laboratory examinations. A few of the latter had positive blood cultures but gave no history or evidence of being ill. Confirmation of diagnosis was available for the 80 cases reported. A summary of the laboratory findings is shown in Table I.

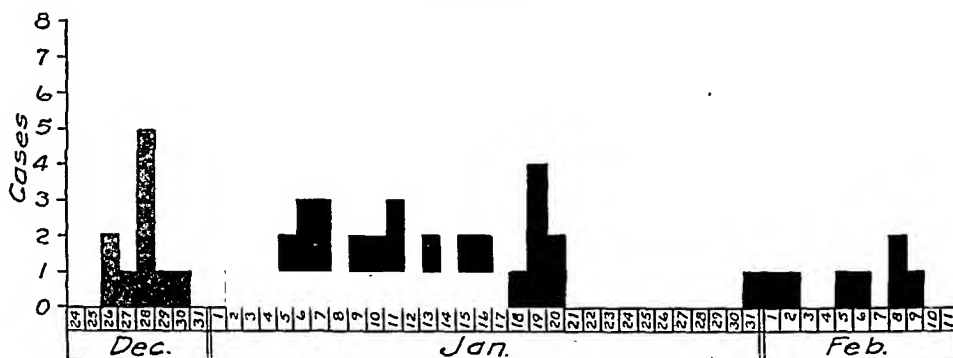
EPIDEMIOLOGY

The distribution of the cases by dates of onset is shown graphically in Figure I.

TABLE I
Laboratory Findings

<i>Blood Culture</i> <i>Br. Melitensis</i>	<i>Agglutination</i>	<i>Skin Test</i>	<i>Phagocytosis</i>	<i>Totals</i>
X	X	X	X	35
	X	X	X	40
		X	X	5
Totals 35	75	80	80	80

FIGURE I



Eleven gave a history of having had chills, headache, and fever during the Christmas holidays and several students appeared at the college hospital for treatment on the day classes were resumed after vacation. The onset of undulant fever is characteristically insidious and many of the patients were uncertain of the actual date on which illness began. There is evidence, however,¹ that the incubation period varies widely and this probably accounts for the distribution shown in Figure I. There were 210 students enrolled for laboratory courses in bacteriology during the first semester, divided into 8 classes, all taking the introductory course and working with non-pathogenic bacteria exclusively. These classes worked in the laboratories on the second and third floors of the build-

ing on the days and time schedule indicated in Table II.

It will be noted that frank clinical illness was present in 37, and 28 were latent or subclinical. The attack rate varied with each class but out of a total exposure, in the regular laboratory classes, this rate was 30.9 per 100. Only one clinical case occurred among students in classes 2 and 3, but no information could be obtained from college authorities relative to laboratory data as to whether it was obtained for the members of these classes.

In addition to the 65 cases in the regular classes 15 other cases occurred. Ten of these were students in other courses who used the same laboratories as the regular students for special assignments in parasitology, poultry pathology, etc., one a plumber who

TABLE II
Student Data

Class	Time Schedule	Location of Laboratory	No. in Class	No. Infected		Attack Rate Per cent
				Frank	Latent	
1	M-F 8-10	2 Floor	28	9	3	42.8
2	M-W-F 10-12	2 "	32	..	..	?
3	M-W-F 1-3	2 "	31	1	..	?
4	T-T-S 8-10	3 "	9	1	2	33.3
5	T-T-S 10-12	3 "	20	1	..	5.0
6	M-W-F 3-5	3 "	34	9	12	61.7
7	M-W-F 10-12	3 "	33	14	8	66.6
8	M-W-F 1-3	3 "	23	2	3	21.7
Totals			210	37	28	30.9

worked in the building; one a stenographer employed in a library on the second floor; one a stockroom attendant; one a student who paid social visits to a friend in one of the regular classes; and one a salesman who made but one visit to the building on December 13.

The history of this salesman is worthy of special comment. His date of onset was January 14, making an incubation period of 32 days. He went to bed January 19, and a definite diagnosis was made February 6. A blood culture taken February 6 showed *Brucella melitensis*. It was thus quite definitely established that the exposure of the patients took place about the middle of December.

Every case found to be infected with Brucella melitensis had been in the bacteriology building during the month of December.

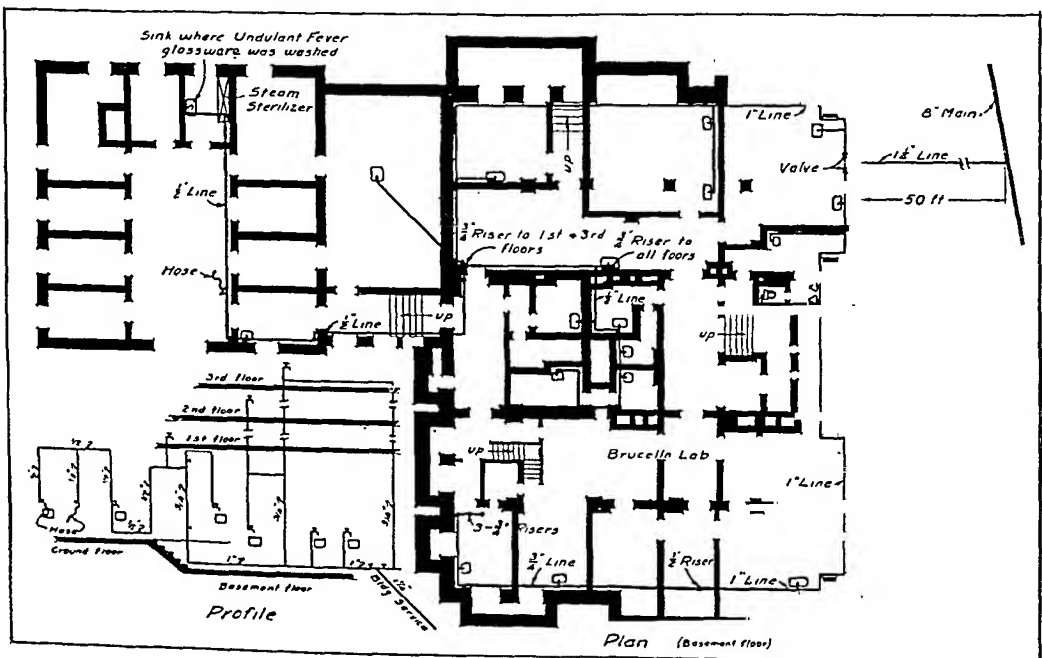
Complete histories were obtained on all clinical cases. None had had any contact with goats or goats' milk. There was no correlation in regard to living quarters, milk supply or other

dairy products, restaurants, banquets or dinners. All evidence pointed to a source of infection which could only have been present in the bacteriology building and common to all who became infected.

Only a few of the patients had ever been in the brucella laboratory in the basement. There was no evidence that any of the cultures of brucella organisms from that laboratory had been taken to the laboratories used by the students. One possible medium which could have been a disseminator of the bacteria was water through the service within the bacteriology building.

The building is quite old and unsuitable architecturally for its purpose. Adaptation of the plumbing system to meet the demands of greatly augmented numbers of students during the past several years has greatly exceeded the capacity of the service. (See Figures II and III). It will be noted that the building's water supply is obtained from the college distributing system through a 1¼ inch service pipe approximately 50 feet long. Immediately

FIGURE II



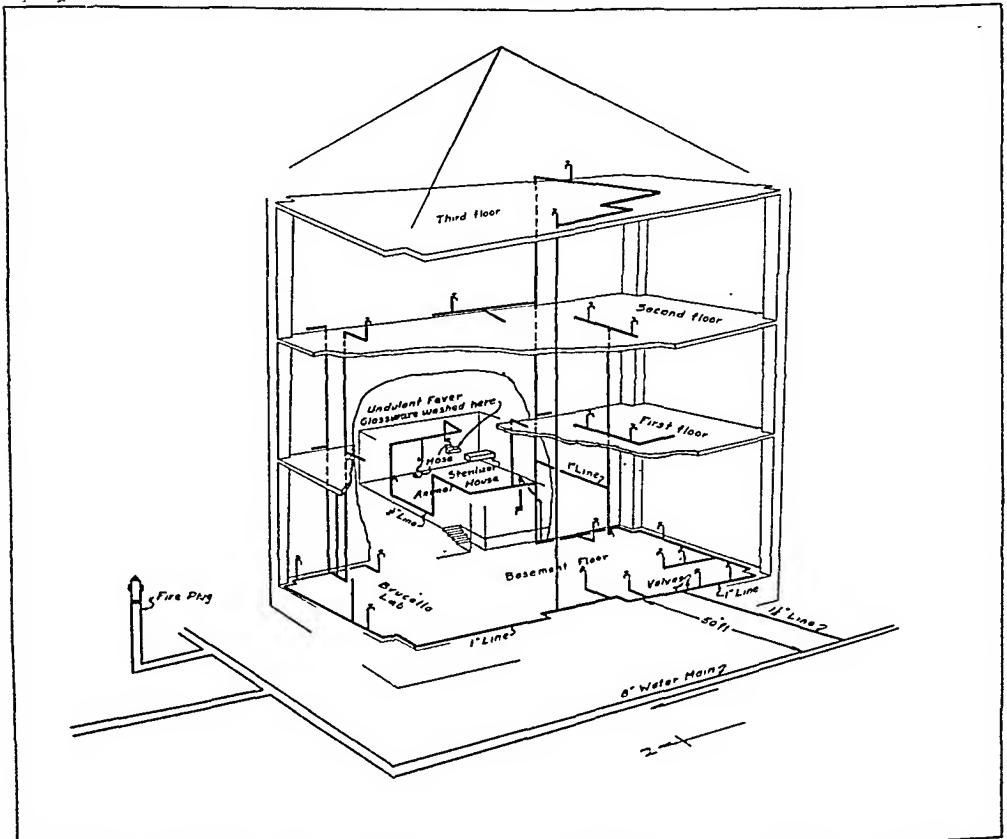
inside the building there is a T coupling diverting the water into two 1 inch lines which extend around the building in opposite directions but do not reconnect. One inch risers serve the first, second, and third floors.

It was a custom of the brucella laboratory to place discarded cultures contained in Petri dishes and culture tubes in copper containers of about 1 cubic foot capacity. These were packed full, a tight fitting cover adjusted, and placed in an Arnold sterilizer. At the end of 1 hour's exposure to steam the dishes were removed, media scraped out, and the glassware washed in a nearby sink. As a test of the effectiveness of this sterilization we carried out the following procedure: On removal of the copper container after 1

hour it was found that the glassware could be comfortably handled immediately and that the agar media was not even melted. It was obvious that the method was entirely inadequate for sterilization of cultures.

The custom followed in washing the glassware was as follows: After the media was discarded the glassware was put in a large dishpan in the sink, the dishpan filled with water, and after a period of soaking the glassware washed. A piece of rubber tubing connected to the faucet was used to prevent breakage. When the dishpan was filled this tubing extended below the surface of the water in the dishpan. The possibility of siphonage if a negative pressure obtained in the water system was apparent.

FIGURE III



DEMONSTRATION OF SIPHONAGE

By opening several faucets in the basement a negative pressure was produced in the faucet at the sink where the glassware was washed. A pressure recorder on the third floor showed a negative pressure equivalent to 2 inches of mercury when all outlets in the basement were allowed to remain open. A solution of fluorescein was placed in a container in the sink used for washing glassware and after a negative pressure was produced at that point the dyed water was siphoned into the water system. After the dye had reached beyond the riser pipes to the upper floors the pressure was again returned to positive, and green water was obtained from every outlet in the building.

Referring to Figure III it will be noted that one of the riser pipes supplying the third floor is connected with the line supplying the sink where the glassware was washed. This allowed for more direct water communication between this sink and the third floor laboratory. Considerably more pipes would need to be traversed by contaminated water to reach the first and second floors. This fact may have been

responsible for the higher percentage of infected students among those using the third floor than among those using the second floor.

A new sink and 2 autoclaves were installed in the building during December. The water main outside the building had been tapped for a service to a new building nearby. Thus, in addition to the possibility of negative pressure being created by the simultaneous opening of a number of outlets in the building, there were additional possibilities when the water was shut off during these installations.

SUMMARY

1. An outbreak of 80 cases of infection with *Brucella melitensis*, with 1 death, occurring at Michigan State College, East Lansing, Mich., is reported.

2. All cases occurred in students and others using a bacteriology building which contains a laboratory that handled large numbers of brucella cultures.

3. A faulty technic of sterilization of discarded cultures was demonstrated.

4. Inadequate and faulty plumbing was found in which siphonage could be produced from the point where contaminated glassware was washed.

REFERENCE

1. Hardy, A. V., Frant, S., and Kroll, M. M. The Incubation Period in Undulant Fever. *Pub. Health Rep.*, May 20, 1938, pp. 796-803.

Vitamin D Potency of Human Breast Milk*

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FOR the prevention and cure of rickets in infants, human breast milk is admittedly superior to cow's milk. One would naturally assume this superiority to be based on a larger content of vitamin D in breast milk. Although quantitative data have not

hitherto been available, there are three investigations which indicate how little vitamin D breast milk contains, for no evidence of healing in rachitic rats was observed after feeding the quantities of human milk shown in Table I. Likewise, no evidence of healing was

TABLE I

cc.	Breast Milk	Total Fed cc.	Authors
	Fed Daily Days		
25	9	225	Hess, Weinstock and Sherman ¹
40 (condensed)	7	280	Outhouse, Macy and Brekke ²
20	8	160	Bunker, Harris and Eustis ³

TABLE II

Human Butter Fat Fed Daily *	Total Fat Fed	Equivalent Amount * of Breast Milk	Authors
0.2 cc.	1.6 cc.	50 gm.	Hess and Weinstock ⁴
0.3 gm.	2.4 gm.	73 gm.	Lesne and Vagliani ⁵
0.48 gm.	3.84 gm.	116 gm.	Palmer and Kennedy ⁶
0.72 gm.	5.76 gm.	173 gm.	Sabri and Fikri ⁷
0.36 gm. (Irrad.)	2.88 gm.	86 gm.	Sabri and Fikri ⁸

* Assuming a consumption of 6.0 gm. of diet/rat/day, a feeding period of eight days, and a butter fat content of 3.3 per cent.

* Read by title before the Food and Nutrition Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 25, 1938.

Contribution No. 149 from the Biological Research Laboratories, Massachusetts Institute of Technology, Cambridge, Mass. This investigation was aided by a grant from the Permanent Science Fund, American Academy of Arts and Sciences.

recorded after feeding the amounts of butter fat shown in Table II.

In competent bioassay laboratories it has been found that substantially 3 USP XI units of Reference Oil are usually required to induce a unit (2+ on the Bill's scale) of healing in rats

TABLE III

Antirachitic Effect of Cream and Butter Fat Prepared from Human Breast Milk

Rat	Supplement		Equivalent Volume of Breast Milk	Line Test (Bill's Scale)
			cc.	
20030	10	cream	60	0.0
20031	10	"	60	0.0
20032	10	"	60	0.0
20033	10	"	60	0.5
20034	20	"	120	0.0
20035	20	"	120	2.5
20036	20	"	120	3.0
20037	20	"	120	1.5
20038	25	"	150	1.5
20039	35	"	210	2.0
20040	20	"	120	0.0
20041	25	"	150	0.0
20700	1.0	butter fat	30	0.0
20701	2.0	" "	60	0.0
20702	5.0	" "	150	0.0
20703	10.0	" "	300	3.0
20704	15.0	" "	450	1.5

made experimentally rachitic on the Steenbock 2965 ration. It appears, therefore, that since none of the above feedings of breast milk, or its fat, induced recognizable healing, there is evidence that mother's milk does not contain as much as 10 USP XI units of vitamin D per quart.

The investigation being reported was undertaken to determine the vitamin D potency of winter breast milk.

EXPERIMENTAL PROCEDURE

Sixty quarts of breast milk from wet nurses were obtained through the coöperation of the Boston Dispensary. Cream was obtained by passing this milk through a home-sized De Laval Cream Separator. Ten gm. of this cream, containing 20 per cent butter fat, produced no healing (Table III) when fed in the rachitogenic diet of each of 4 rachitic rats (20030-33) over a period of 6 days, while 20-35 gm. portions produced varying degrees of healing when fed 8 other rats (20034-41).

The remainder of the cream was extracted with four successive portions of anhydrous ethyl ether and the solvent was removed in vacuo under a stream of carbon dioxide. Graded portions of this ether-soluble fat were fed in the diets of each of 5 rachitic rats (20700-04) over a period of 6 days. The animals readily ingested quantities up to 10 gm., this latter amount producing definite rachitic healing (Table III). The animal fed a 15 gm. quantity showed rachitic healing but failed to gain in weight during the 12 days required for consumption of the supplement.

It is likely that the large feeding of fat prevented an accurate assay. Therefore, the remainder of the butter fat was saponified with 10 per cent aqueous potassium hydroxide and the ether-soluble fraction of the non-saponifiable material was fed in graded amounts to another series of 8 animals during a period of 6 days. One gm. of this material was equivalent to approximately 2,900 cc. of milk.

TABLE IV

Antirachitic Effect of Non-Saponifiable Fraction Prepared from Breast Milk Butter Fat

<i>Rat</i>	<i>Supplement gm. non-sap.</i>	<i>Equivalent Volume of Breast Milk</i>	<i>Line Test (Bill's Scale)</i>
21126	.210	600	1.5
21127	.225	642	2.0
21128	.240	687	1.5
21129	.255	730	2.5
21340	.255	730	2.5
21341	.255	730	2.5
21342	.255	730	2.0
21343	.255	730	2.0

The results (Table IV) of the assays of this non-saponifiable material indicate that an equivalent of 730 cc. of human milk contain 3 USP XI units of vitamin D. The potency of the breast milk was therefore of the order of 4 USP XI units per quart.

DISCUSSION

The 15 gallons of breast milk used in these experiments, gathered during December, 1937, and January, 1938, constitute the largest, and therefore most representative, sample of human breast milk ever subjected to bioassay at one time. To conduct this assay it was necessary to prepare the non-saponifiable fraction of the milk fat since a rat will not consume enough breast milk or butter fat daily for a precise assay.

The results indicate that the milk from women in an urban community during the winter months contained not over 4 USP XI units per quart. It has been reported that cow's milk during the summer contains between 23 and 36 USP XI units per quart.

Whence, then, the greater power of breast milk, even in the winter, to protect the human infant against rickets more adequately than modified summer cow's milk? In the bottle feeding of the very young infant, cow's milk is customarily diluted with an equal volume of water. Such modified milk has a vitamin D content of at least 11

USP XI units per quart—nearly 3 times that of human breast milk. As the infant grows and formulae are changed, this disparity widens. The explanation lies elsewhere than in the vitamin D content.

Previously,³ we reported that the milk from mothers fed metabolized milk contained an equivalent of 21 USP XI units per quart. On the basis of the present finding, it may be seen that the vitamin D content of breast milk can be increased at least five-fold.

CONCLUSIONS

1. A composite sample of 15 gallons of human milk contained only 4 USP XI units of vitamin D per quart.

2. The antirachitic superiority of human milk over cow's milk in infant feeding cannot be attributed solely to the quantity of vitamin D which it contains.

3. It is possible to increase the antirachitic potency of human milk at least five-fold by feeding metabolized milk to the lactating mother.

REFERENCES

1. Hess, A. F., Weinstock, M., and Sherman, E. Antirachitic Properties in Human Milk Developed by Irradiating the Mother. *J.A.M.A.*, 88:24, 1937.
2. Outhouse, J., Macy, I. R., and Brekke, V. Human Milk Studies. V. Quantitative Comparison of the Antirachitic Factor in Human Milk and Cow's Milk. *J. Biol. Chem.*, 78:129, 1928.
3. Bunker, J. W. M., Harris, R. S., and Eustis, R. S. Antirachitic Potency of the Milk of Human Mothers Fed Previously on Vitamin D Milk of the Cow. *New Eng. J. Med.*, 208:313, 1933.
4. Hess, A. F., and Weinstock, M. A Study of

the Antirachitic Factor in Human and in Cow's Milk. *Am. J. Dis. Child.*, 35:845, 1927.

5. Lesné, E., and Vagliani, M. Production d'un Lait de Vache Donné de Propriétés Antirachitiques. *Compt. rend. Acad. d. sc.*, 179:539, 1924.

6. Palmer, L. S., and Kennedy, C. Antirachitic Properties of Breast Milk. *Proc. Soc. Exper. Biol.*

& Med., 23:230, 1925.

7. Sabri, F. A., and Fikri, M. M. Experimental Study of the Antirachitic Factor in Human and Animal Milk. *Arch. Dis. Childhood*, 7:239, 1932.

8. Sabri, F. A., and Fikri, M. M. Further Study of Antirachitic Factor of Human Milk. *Arch. Dis. Childhood*, 10:377, 1935.

Industrial Hygiene Codes*

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INDUSTRIAL hygiene codes in this discussion have to do with rules for the control of occupational disease exposure in industry.

All are familiar with the numerous safety codes prescribing rules and methods for the prevention of industrial accidents. Industry generally became safety minded years ago and set up rules and safe practices for the elimination of accidents, because the dangers of hazardous practices, devices, and operations were quite obvious to the average layman, and the effect of an accident was at once evident.

Unfortunately, it has only been in recent years that we began to realize that there were other occupational hazards considerably less obvious than accidents that should receive intelligent attention, particularly occupational diseases arising out of and in the course of employment. One only has to go back a few years and review the various state labor laws or industrial codes and note the very limited number of rules pertaining to health hazards, and even in these few cases the rules were largely limited to certain requirements for grinding and polishing operations.

Taking for example the few state requirements for safeguarding grinding

and polishing operations, it was found that no two states agreed anywhere in reason on the air volume or air velocity required for exhaust equipment. The extremes varied from a maximum of 9,000' per minute velocity in the branch pipe to a minimum of 2" static suction as measured with a U-tube manometer gauge.

Within practically the past 6 years, we have become somewhat occupational disease conscious, brought about principally through the hysteria of the silicosis phase of the question. I say hysteria advisedly because it very nearly amounted to sabotage of certain industries from some sources, although it cannot be denied that hazards in many forms existed. At any rate it was obvious that we must know more about our problem and the measures necessary for the effective control of occupational diseases.

Some of the various branches of the industry, particularly the foundry industry, felt that the only way to obtain an intelligent understanding of their specific problems was to start an educational program and openly discuss the various phases of disease exposures in technical meetings and cooperate with various bodies attempting to suggest remedies to the industry. It was at once apparent that there was a great divergence of opinion as to the proper measures for control. The foundry

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industry therefore undertook the task of studying and setting up industrial hygiene codes applying to all phases of activity wherein there was an exposure to an occupational disease hazard. I suppose there is no industry that has so many ramifications and such a variety of operations wherein certain control measures may be required as the foundry industry and its allied departmental activities. A good start has been made in the developing of such codes and it is the purpose of those engaged in drafting the hygiene codes to continue their efforts until the whole industry has been covered.

In starting the task of formulating the codes, it was at once apparent that we lacked fundamental data for a great deal of our problem. True, we had the help and experience of the best informed industrial medical men, which was of value in pointing out the danger points to be safeguarded. With the knowledge gained from the industrial medical authorities as to what we should set up our codes for, we had our starting point.

The first thing we had to do was to develop a code prescribing a more accurate method of measuring and determining the flow of air in exhaust systems so that the vendor of equipment could intelligently meet the specifications and the plants had a prescribed method of knowing how to determine the functioning of the exhaust systems. Another code developed had to do with the fundamentals of design, construction, operation, and maintenance of exhaust systems. Surprising as it may seem, few people had any fundamental knowledge of design, and most systems were laid out by rule of thumb methods. Considerable research work was necessary, and we found out that the friction formulae for resistance of air flow in straight pipe that we had all been using were very much

in error; also, the resistance losses in round elbows that had been accepted practice were at considerable variance with actual facts disclosed by research.

A code was developed applying to exhaust systems for grinding, polishing, and buffing equipment. This code attempts to put into orderly arrangement the various sizes of connecting branches with relation to wheel sizes, as well as specifying minimum air velocities.

Still another code has to do with the ventilation of the various types of tumbling mills. This was a difficult problem on account of the fact that the vendors had been building mills for years, and pattern equipment existed that could not be scrapped without imposing a severe price handicap to prospective purchasers of equipment.

Codes are under way for many additional types of equipment and processes in the industry.

In addition to equipment and process codes, there are codes being developed to control the specifications covering the toxic properties of certain commodities that are rather universally used in the industry, as well as prescribing safe methods for the use of such toxic materials.

In all of the code material providing for the suppression of dusts, gases, fumes, and vapors, the requirements are based on the best known engineering practice that exists at the present time. Dust counts are not recognized in any of the code material, for the reason that dust counts are still a very controversial subject and mean little or nothing to a great many plants that do not have highly trained experts familiar with dust count equipment and technic.

In the foundry industry, we believe that we have some definite facts about the development of industrial codes, and from these facts have adjusted the policy of our code committee activity. Some of these facts are:

1. One has to be occupational disease minded to comprehend the necessity for the development of industrial codes.

2. The people best qualified to develop a practical and intelligent industrial code are employers and users of equipment, because they understand all limiting factors of equipment and processes.

3. Vendors of equipment and processes should be party to the code development in order to give the advantage of their experience and that they may adjust their viewpoint to that of the user of the equipment to obtain maximum protection.

4. Make use of all pertinent information and personnel from recognized units, such as the U. S. Public Health Service, where there is a background of research and investigation of the phases of the problem under consideration.

The beneficial effects of having good industrial codes are manifold and some of the more important items are:

1. They provide the industry with the latest and best engineering data for the control of hazardous pieces of equipment, operations, or processes.

2. They put in the hands of the small employer who does not have an engineering staff, technical information for his use in order to specify types of equipment, exhaust systems, etc.

3. They put the vendors of equipment and systems on the same specification basis as to the requirements of the prospective purchaser.

4. Available good industrial codes make it possible for the legislative bodies to have up-to-date information available for their consideration and deliberation.

5. The proper observance of the requirements of industrial codes in controlling hazardous exposure will result in a large decrease in occupational diseases and compensation paid out.

With a good code that is observed, hardly any industry need pay out more than one cent for compensation per \$100 of pay roll. The company I am associated with, we are proud to say, very early recognized its moral obligations with respect to hazards. For the year 1937 they paid out approximately $\frac{1}{4}$ mill per \$100 of pay roll, and a good part of this money consisted of dermatitis claims.

One cannot be closely identified with the development of industrial hygiene codes without forming some very definite opinions as to what would constitute an ideal set-up for state industrial hygiene codes. When a state passes acts of legislation requiring certain minimum specifications and engineering details for the control of an occupational hazard, difficulties are at once encountered because there are always exceptions to the rule due to the tremendous variations of performing operations and in operating equipment. It is impossible to conceive or provide for all of these variations in a law. Hence a certain amount of confusion arises immediately. The same general argument holds good for state industrial codes which have the force and effect of law, although it is usually easier to modify industrial codes by means of public hearings than it is to get a legislature to make changes. A better method is to have an enabling act of legislature providing for a state supervising or enforcing agency that shall be charged with the duties of formulating rules and regulations for the protection of the health of workers and also for the enforcement of such requirements. The rules and regulations so formulated should be of a general requirement character only and not specific as to physical dimensions and engineering details.

One of the principal requirements of the general code shall be that of the supervising department having the power to adopt and apply reasonable and up-to-date physical engineering details and data more or less in the form of an appendix to the general code, but definitely not a part of the code, so that it will not have the force and effect of law. This plan makes it possible for the supervising department to have some discretionary power to meet the unusual situation as it arises, and further permits changing the en-

engineering requirements as better information and knowledge become available on the subject. This method outlined would permit the supervising agency to keep abreast of the times, and would eliminate numerous handicaps and confusion.

It is our definite recommendation based on the experience we have had in the foundry industry, that every industry should develop a code for the control of occupational disease hazards.

Having developed such a code they should make every attempt to get that industry to apply the code to its hazardous operations. This will aid materially in bettering the working conditions by promoting good housekeeping, it will prevent disability through removal of hazardous exposures and result in operating economies through lowered compensation paid for occupational disability and through improved working methods of operation.

DISCUSSION

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Mr. Allan is to be commended on his paper and on the concise manner in which his topic has been handled. The subject is a large one and extremely difficult to handle in a short presentation.

I am quite familiar with the particular foundry code which has already been developed by a capable committee headed by Mr. Allan as chairman. While this code is not entirely in agreement with our own Wisconsin requirements, particularly as to air velocities, I feel that it is an excellent treatise and can well be invaluable to the foundry industry. It may also serve as a guide to other industries in preparation of similar codes for their own purposes. This code places in the hands of the foundryman complete information relative to the removal of hazardous dusts, fumes, vapors and gases and gives all of the information necessary for a complete design from the isolation at the source of the hazard to the final collection or method of disposal.

This code, which really can be classed as a textbook, is of necessity entirely different from the type of codes or rules

which should be prepared by governing bodies, such as state organizations. These codes should not in any sense be of the textbook form, but should be so designed as to act merely as a guide to the competent designer or engineer who has both the experience and other necessary design data on hand for his design. These codes need only set up detailed standards as to general requirements and as to the results to be accomplished.

Mr. Allan points out the difficulties which are encountered when a state legislature passes laws requiring certain minimum specifications and engineering details for the control of occupational hazards within its respective state. He is entirely correct in his viewpoint, as such a procedure sets up a legal requirement which cannot be changed except by legislative repeal or amendment. It is far better to have an enabling act passed which designates to some proper and competent administrative body the power to draw up and set forth the rules or orders which may be necessary to provide proper working conditions.

Such a situation exists in Wisconsin,

where the legislature about 27 years ago created the Industrial Commission and, among other duties, empowered this commission to prescribe, modify, and enforce orders for the protection of life, health, safety, and welfare of employees and frequenters of public buildings and places of employment within the state.

Among the publications which have been issued covering various phases of safety and sanitation is the industrial hygiene code entitled "General Orders on Dusts, Fumes, Vapors and Gases." This code contains general fundamental requirements for protection, setting up necessary face velocities and also the required minimum velocities through the branch ducts which are based on U-tube suction readings. Such a method, rather than the pitot tube method was deemed necessary due to the fact that check-ups of exhaust systems are made by the general field deputies of the commission, and it would be impractical to equip them with any more elaborate equipment for this purpose than a U-tube. Our code further specifies the minimum gauges of metal to be used, indicates the minimum sizes of main ducts in proportion to the entering branches, provides for the maximum angle of entrance for branch ducts, makes provision for proper disposal of the entrained material, and in general is so set up as to be a guide to the

engineer or manufacturer in the design of his exhaust system.

These orders, however, are flexible in that they can be modified without legislative action in special cases. We have found, during the more than 6 years that this code has been in effect, that the requirements which have been set up are proving quite satisfactory for the general run of manufacturing plants. Occasionally, however, a situation arises in connection with certain processes where modification is necessary, and in such cases this modification is granted. There are also other situations where careful engineering design is provided and where exceptional maintenance and supervision of the equipment is furnished which may also permit reduction in air volumes and velocities. Such a modification was granted to Mr. Allan's company for its Milwaukee plant and was definitely based on its engineering design and the particular maintenance and supervision which is provided at all times.

It has not been my intention to advertise Wisconsin's code, but merely to point out that individual state codes can be provided which are sufficiently flexible to take advantage of good design and to progress as better information and increased knowledge become available on the subject. I believe that this coincides quite well with the ideas expressed by Mr. Allan.

Vital Statistics of the Pueblo Indians*

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THIS paper deals with the demographic facts available for one group of North American Indians, the Pueblos of New Mexico. These Indians constitute a population of about 12,000 living on 19 reservations along a 300 mile line from Taos in the north to Zuni on the western border. For centuries they have existed in small compact communities, cultivating the fertile strip along the banks of the Rio Grande and other rivers. Because of their settled agricultural and communal life their customs and habits are more highly stabilized than those of other Indians. Comparatively little migration has taken place between the Pueblos and other racial groups. They have maintained themselves as tightly bound, largely self-governing groups, and while it is impossible to claim for them absolute purity of blood the findings of the United States Census for 1930 show that the two linguistic stocks with

which we shall deal, the Keresan and Tanoan, assert themselves to be 98 and 95 per cent respectively, "full blood."

THE RECORDS

Since the Spanish conquest the Pueblos have been under the religious direction of the Roman Catholic church and the records of baptisms and burials are preserved in their parishes. During this period censuses varying in completeness were made at irregular intervals. Following the American occupation of New Mexico and the subsequent appointment of an Indian Agent in 1849, official population counts were made occasionally until about 1900, estimates being submitted to Washington in the intervening years. Between 1900 and 1910 a more thorough system of recording pueblo membership was introduced. This took the form of a census roll for each pueblo, giving the details of name, age, sex, family connection and degree of blood for each member of the pueblo. These were revised from year to year by field employees of the Indian Service who necessarily used the records in their daily work and

* Read before the Vital Statistics Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 27, 1938.

had the opportunity to consult with the Indians as to their accuracy. The revisions consisted of additions to the pueblo by birth and immigration and removals through death and emigration.

The rolls, although revised annually, had never been corrected by means of an actual enumeration until 1936 when a canvass was made for this purpose by Indian Service and Soil Conservation Service employees. In addition the records were submitted to the governor and council of each pueblo for further verification and for certification as to their accuracy. The fact that these census rolls, which are believed to be as accurate as it is possible to make them, differed in no important respect from the earlier ones, supports our assumption that the old rolls were substantially correct except possibly for the statements as to degree of blood.

Supplementary to the revisions of the census rolls, the standard birth and death certificates of the U. S. Bureau of the Census have gradually come into use. While they are signed by physicians for the relatively few hospital deaths, the field nurse is responsible for the greater number. Therefore certification can be considered correct only as to the event of death and not as to cause.

In conjunction with the recently revised census roll a new system of collection has come into effect. Native enumerators have been appointed for each pueblo who receive a suitable fee for every report of a birth, death, marriage, divorce, or change in membership. Monthly reports are sent to the main office of the United Pueblos Agency together with birth and death certificates for which the nurse is still responsible. Upon receipt at the main office, the monthly data are incorporated into what is essentially a population register. A master card for each member of every pueblo has been prepared and placed on file which contains all

the information given on the 1936 census roll, *i.e.*, name, parentage, relation to household head, address, sex, date of birth, legitimacy, blood, and tribe, with provision for changes in such items as address and relation to household head. In addition, space is allowed for a full record of the events of marriage, childbirth, and death as they occur. When this system has been perfected its supervision by one clerk will permit of a complete and continuous check on the approximately 12,000 Indian inhabitants of the pueblos.

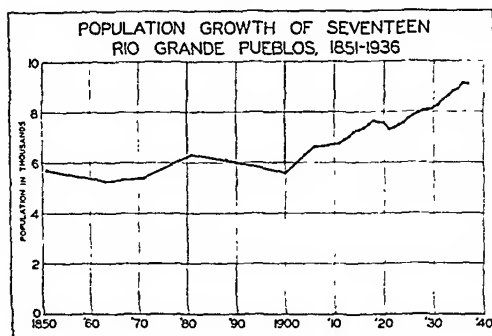
The demographic aspects presented here relate to 17 of the 19 pueblos, for which practically complete censuses exist. The data for Santo Domingo and Zuni have been excluded, the first because of native resistance to outside interference and the second because of similar difficulties as well as the relative dispersion of its population. The 17 pueblos contained altogether 9,104 persons in 1936. They range in size from Laguna, with 2,367, to the practically extinct Pojoaquè, with 20 persons. As we cannot establish accuracy for natality and mortality reporting prior to 1926, mortality and natality rates have been computed for an 11 year period only, 1926-1936, inclusive. The population data have been taken from the census rolls, and those for natality and mortality from the rolls as well as from the existing birth and death certificates. Assistance in certain phases of the tabulation was secured from the Carnegie Institution of Washington.

POPULATION GROWTH

Chart 1 gives the population curve of the 17 pueblos during the period of American control. Only those population figures are shown for the period before 1911 upon which some degree of reliance can be placed.

The pueblos, previous to 1900, contained between 5,000 and 7,000 persons.

CHART 1



Since then a gradual increase has taken place checked only by the influenza epidemic of 1918-1919. This upward trend cannot be entirely accounted for by the improvements in enumeration and is due to an actual population growth. Recent newspaper publicity on the growth of the Indian population of the United States since 1900 gives tardy recognition to this trend, true not only of the Pueblos, but also of other Indian tribes.

POPULATION DISTRIBUTION BY AGE AND SEX

The 1936 age-sex diagram of the population of the 17 pueblos, together with those of whites and negroes for the United States in 1930, is shown in Chart 2. The Pueblo diagram demon-

strates a high proportion of children in the population, and a smaller percentage of females over 35 years of age as compared with males. In the latter respect the Pueblo Indians are similar to the Negroes.

TRENDS OF NATIVITY AND MORTALITY

The trend of the birth rate, death rate, infant mortality rate, death rates of persons under and over 5 years of age, and the vital index are shown in Chart 3 and Table I for the years 1926-1936, inclusive. For this period the average annual death rate was 20.9 per 1,000 population, the birth rate, 38.0 per 1,000 population, and the infant mortality rate, 171.2 per 1,000 live births. The vital index was 185. The infant mortality rate, which appears to be slightly increasing, is the only annual series showing a trend. The increase, however, is not statistically significant, and we are inclined to attribute it to an improvement in recording infant deaths. In the earlier years when death certificates were not available, our use of the census rolls to determine the number of deaths would not reveal deaths which occurred before names could be entered. In a careful study of infant mortality in the

CHART 2

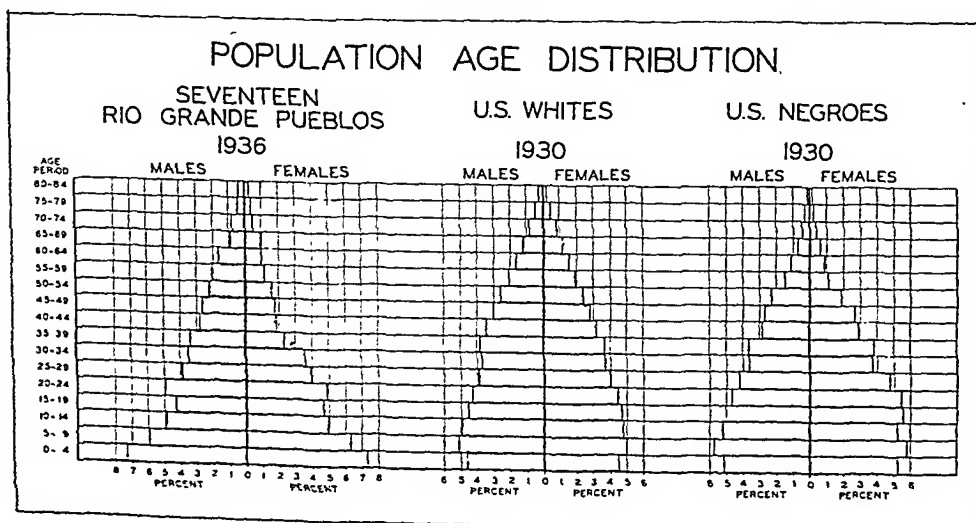


TABLE I

Annual Birth and Death Rates and the Vital Index for the Indians of Seventeen Rio Grande Pueblos, 1926-1936

Year	Birth Rate *	Death Rate *	Infant Mortality Rate †	Death Rate		Vital Index ‡
				Under 5 Yrs.*	Over 5 Yrs.*	
1926	34	17	126	70	10	201
1927	37	23	177	106	10	163
1928	41	23	159	87	14	175
1929	39	20	133	62	13	196
1930	37	22	186	68	15	168
1931	39	23	206	81	13	172
1932	37	18	152	52	12	211
1933	37	16	135	50	10	229
1934	41	27	213	115	13	150
1935	36	18	152	69	10	203
1936	35	20	224	80	11	171
Annual Average	38	22	171	76	12	185

* per 1,000 population

† per 1,000 live births

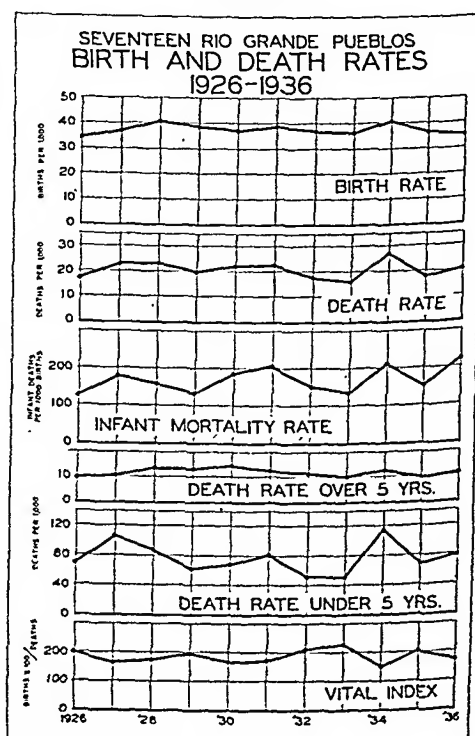
‡ (births x 100)/deaths

pueblos of San Juan and Santa Clara for the years 1925 to 1930, Aberle found the infant mortality rate to be above 200.

The difference between the birth and death rates, amounting on the average to an annual increase of 17.1 persons per 1,000 population, is sufficient to account for the change in population numbers since 1926, and can be presumed to be responsible for the increase between 1900 and 1926. But in the absence of natality and mortality data covering this latter period and due to the fact that it is improbable that the birth rate has increased substantially, we are led to regard a significant lowering of mortality during the period 1900 to 1910 as the factor leading to the increase in population. The explanation, we believe, lies in the change in the number and degree of severity of epidemics experienced by the Pueblo Indians. Quantitative information on this point is lacking, but the belief is borne out by early historical records and the annual narrative reports of the Pueblo Indian Agents. The latter,

published in the *Annual Reports of the U. S. Indian Service* up to 1906, and to be found in the government archives for subsequent years, comment upon the health of the pueblos. The occur-

CHART 3



rence of an epidemic was usually noted, with mention of the type of the disease and the pueblos in which it occurred.

The great smallpox epidemic of 1781 is classic in the history of the Southwest. Bancroft records that among the Pueblo Indians 5,000 deaths occurred in that year out of an enumerated 9,000 in 1760. Bloom has translated the accounts of the introduction of vaccination in New Mexico in 1804 and relates that in 1805 a count of those not having had smallpox showed that in the pueblos and Spanish settlements of central New Mexico over two-thirds of the children under 12 had had the disease. The report did not record numbers for men and women because, the *alcalde* states, ". . . in all this jurisdiction no one has been found who is more than 6 years of age who has not suffered from the sickness of smallpox." The subsequent wide-scale program of vaccination was not maintained, however, for between 1837 and 1840 a combined siege of smallpox and typhoid is recorded as having killed one-tenth of the inhabitants. As late as 1889 the Indian Agent reports: "At a few of the pueblos there has been a great deal of sickness during the past year . . . and it is estimated that about 400 have died during the past year at said pueblos, smallpox and diphtheria being the principal diseases." In the two following years these diseases spread to other pueblos, causing further fatalities. In 1894 and 1895 spinal meningitis or spotted fever caused a considerable number of deaths in two of the pueblos.

During the next decade, however, the story changes. In 1903-1905 diphtheria appeared again but the introduction of antitoxin was successful in checking mortality from the disease. During the latter half of the decade no record of serious epidemics has been found. Vaccination of the pueblo school population was reported to have been carried out in 1896, but in 1913-1914

a complete vaccination of the pueblo population was ordered. Shortly after, smallpox broke out among the Navajos to the west and subsequently spread over New Mexico into the Spanish population in the region of the pueblos but not to the vaccinated Pueblo Indian population. Since 1900 only one epidemic of a size markedly affecting the population curve has occurred, the influenza epidemic of 1918-1919. As to other epidemics we find record, for example, that measles and diphtheria caused the deaths of approximately 100 children in the pueblo of Santo Domingo in 1915. Other notes regarding the appearance of diphtheria, measles, scarlet fever, whooping cough, and influenza appear in the narrative reports, but now the epidemics are measured in numbers of cases rather than deaths, and frequent comments on the mildness of the diseases are found. Trachoma and tuberculosis have long been of serious concern among the pueblos. But the great epidemics of the 18th and 19th centuries no longer appear, thus making it possible for the disparity between the birth and death rates to manifest itself in population increase.

The decline in epidemic effects on mortality may be attributed to the following factors:

1. The establishment of day and boarding schools between 1870 and 1890 which brought the children of the pueblos under supervision.
2. The appointment of field matrons during 1880-1890 who, acting as instructors in housekeeping, brought new ideas of cleanliness.
3. The beginning about 1900 of the appointment of contract and staff physicians.
4. The practically complete vaccination of the pueblo population in 1913 and 1914, and the introduction of the use of diphtheria antitoxin.
5. The introduction of driven wells in the pueblos. In 1914 the first 3 of the pueblos were supplied with driven wells. These were of the approved type with tight casings and concrete caps and, by freeing the inhabitants from the necessity of using water from the

irrigation ditches for drinking purposes, were presumably effective in cutting down typhoid and dysentery.

With these 5 factors, all of which act, by human effort, directly against the effect of infectious disease, we must also include the change in character of smallpox and scarlet fever from severe to relatively mild forms, a phenomenon well known in the United States. Also the possibility exists that by the stringent forces of selection some degree of immunity to the diseases of the white man may have come to the Indian.

MORTALITY BY AGE AND SEX

The variation in mortality by sex and broad age groups for the 11 year period is shown by the rates (per 1,000 population) of Table II. Similar rates for the white and colored population of the U. S. Death Registration Area of 1930 are also given.

tive to the female, is 28 per cent higher as compared to 25 and 22 per cent for the whites and negroes respectively. The females exceed in mortality during the period of middle life. Aberle has previously shown that maternal mortality is high among Pueblo women and although we have no data on causes of death it appears that this factor, together with tuberculosis, may account for the excessive female mortality between 15 and 45 years of age.

In contrast with the whites and negroes, Pueblo mortality by sex shows for the Pueblo population a greatly excessive mortality at the younger ages, an excess which gradually diminishes with advancing age until, in the age group 25-44.9, the Pueblo rates lie between those for whites and negroes, and at the oldest age group, 65 years and over, Pueblo mortality is less than for either whites or negroes. The latter

TABLE II

Mortality Rates by Broad Age Groups, Seventeen Rio Grande Pueblos, 1926-1936, Compared with Whites and Colored, U. S. Death Registration Area, 1930

	Males			Females		
	U. S. Death Registration Area			U. S. Death Registration Area		
	Pueblos	Whites	Colored	Pueblos	Whites	Colored
Under 5	98	18	33	76	14	27
5-14	4	2	3	6	1	3
15-24	5	3	8	9	3	8
25-44	7	5	15	11	4	13
45-64	16	18	31	19	14	31
65 and over	65	78	89	55	71	80
Total	21	12	18	21	10	15

Rates per 1,000 population

Comparing the rates for Pueblo Indian males with those for females we find that mortality among the males is considerably higher at ages under 5 and over 65 than among females. The higher death rate under 5 for males is also observed for whites and negroes, but for the Pueblos the male rate, rela-

difference is statistically significant between Pueblos and negroes but not between Pueblos and whites. A check on the accuracy of age-statements of Pueblo Indians over 40 does not indicate that over-estimation of age can account for the low mortality at these older ages. For an explanation of this

TABLE III

Average Annual Birth, Death and Infant Mortality Rates, Seventeen Rio Grande Pueblos, 1926-1936

<i>Pueblo</i>	<i>Population Average 1930-1932</i>	<i>Birth Rate</i>	<i>Death Rate</i>	<i>Infant Mortality Rate</i>
Acoma	1,044	38	16	142
Cochiti	286	48	28	166
Isleta	1,057	35	19	126
Jemez	637	45	32	221
Laguna	2,143	31	15	165
Nambe	128	39	15	55
Picuris	113	42	28	190
Pojoaque	20 *	32	27	286
Sandia	114	42	30	114
San Felipe	539	52	38	274
San Ildefonso	111	49	29	250
San Juan	515	40	21	170
Santa Ana	235	37	21	94
Santa Clara	376	41	23	213
Sia	178	49	23	197
Taos	706	33	16	130
Tesuque	119	53	31	174
Total	8,321	38	21	171

* Estimated

Birth and death rates per 1,000 population; infant mortality rates per 1,000 live births

indicated low old-age mortality, we are inclined to fall back upon the well worn explanation of the "stress and strain of modern life" as the factor producing higher mortality among whites and negroes. Not sharing the oil royalties of his Oklahoma brothers, without automobiles, and deprived by law of the use of intoxicating beverages, the Pueblo Indian can be said to lead a comparatively uncomplicated life.

MORTALITY AMONG INDIVIDUAL PUEBLOS

When the 11 year mortality data are subdivided by individual pueblos, chance fluctuation appears to confuse the picture (Table III). It may be said, however, that generally mortality rates significantly lower than for the pueblo group as a whole are found in those pueblos in which cash income is greatest, such as Acoma and Laguna, which receive employment from the railroad, and in Taos, the New Mexico

tourist mecca and artist colony. On the other hand, high rates appear roughly to be associated with pueblos with a minimum of cash income, such as in Cochiti, Jemez, Sandia, San Felipe, and Tesuque. The infant mortality rates of the pueblos of course vary widely, but it is interesting to note that a significantly low infant mortality rate (126) is recorded for Isleta, the pueblo only 12 miles from the medical and hospital facilities of Albuquerque, and in which an efficient and energetic public health nurse has functioned during the years for which we have data.

SUMMARY

Among races of record, the Pueblo Indian is almost unique in the United States in showing a high birth rate and death rate, neither of which has declined since 1926. The vital index appears to have exceeded and maintained a level over 100 since about 1900, which

has come about by the lessening of the amount of and the effect of infectious disease. However, the high mortality rate, especially at the younger ages, presents a challenge to continued and increased effort on the part of the sanitarians and members of the medical profession interested in the health of the Indian. We cannot consider here the many factors which, once controlled or improved, will yield beneficial results. Diet, further sanitary improvements, the betterment of the economic condition of the Indian, and an increase in medical facilities may be cited. Attention is already being turned to factors

such as these and if such efforts as are being made are continued without financial or political restriction we may expect to see results in a downward trend of mortality among the Pueblo Indians.

BIBLIOGRAPHY

Aberle, S. B. D. Frequency of Pregnancies and Birth Interval Among Pueblo Indians. *Am. J. Phys. Anthropol.*, XVI, 1:63, 1931.

Aberle, S. B. D. Child Mortality Among Pueblo Indians. *Am. J. Phys. Anthropol.*, XVI, 3:339, 1932.

Bancroft, H. H. The Works of: Vol. XVII. *History of Arizona and New Mexico, 1530-1888*. History Company Publishers, San Francisco, 1889.

Bloom, L. B. Early Vaccination in New Mexico. *Publication No. 27*, 1924. Historical Society of New Mexico, Santa Fé.

Newer Research Findings for Dealing with Syphilis and Gonorrhea*

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IN the time at my disposal for the preparation and presentation of this paper, it is not possible for me to give a full digest of the advances made in the last few years in the scientific bases for the control of syphilis, gonorrhea, and other so-called venereal diseases. Important and impressive reports have appeared regularly in the literature and are available to all who wish to go exhaustively into these subjects. I would especially call attention to Padget and Moore's "Syphilis, A Review of Recent Literature," published annually.¹ It is well worth the time of any physician interested in this subject to study Moore's articles.

In 1936 there appeared an excellent report on our knowledge of the gonococcus and gonococcal infections written by Thomas and Bayne-Jones,² the result of 2 years' work by a joint committee of the National Research Council and the American Social Hygiene Association. This report has recently been brought up to date by Dr. Thomas in a project sponsored by the American Neisserian Medical Society and the U. S. Public Health Service. Numerous articles on "Lymphogranuloma Ingu-

nale" have appeared but, so far as I know, there has been no comprehensive summary, though interest has been keen and research active during the last 3 years; nor has there been any comprehensive survey of our medical knowledge of chancroid or granuloma inguinale.[†]

Since time limitations oblige me to choose a few items for emphasis in this presentation of scientific advances, I will briefly discuss what seems to me the most interesting and possibly the most important forward steps.

It is well that the most spectacular discoveries of the last few years have been in the treatment of the most neglected communicable disease afflicting mankind, the "step-child of medicine," the disease known by a

† Reference should be made, for the sake of completeness, to several important reports on the public health aspects of syphilis and gonorrhea. The report of the 1936 Conference on Venereal Disease Control, published by the U. S. Public Health Service, constitutes an excellent presentation of principles and methods of control of syphilis and gonorrhea. Clarke's report of the New York City Commission to Study the Control of Syphilis and Gonorrhea in Scandinavian Countries and Great Britain,³ and Harrison's report⁴ covering the same ground, and in addition Holland, give the facts regarding European progress. "Next Steps in Gonorrhea Control," in the July, 1938, issue of *Venereal Disease Information*, gives the latest ideas regarding the subject indicated. The May-June, 1938, issue of the *Journal of Social Hygiene* describes the status of social hygiene programs and activities, including syphilis and gonorrhea control in official and voluntary agencies throughout the United States.

* Read before the Public Health Education Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 26, 1938.

dozen humorous nicknames, the infection that causes sterility, arthritis, blindness, and chronic invalidism, the most prevalent ailment excepting only the common cold—of course, I mean gonorrhea and other gonococcus infections. Recent discoveries have changed the outlook on the conquest of this ubiquitous disease. We need no longer fumble aimlessly with the colossal problem of gonorrhea.

Three highly important discoveries in the therapy of gonococcus infections have made this difference in the outlook. They are: the estrogenic hormone treatment of gonococcal vaginitis, discovered by Dr. Robert Lewis, of Yale; the fever treatment of gonorrhea to which many experimenters have contributed, including Kumer, Carpenter, Warren, Simpson, and Bierman; and most spectacular of all—sulphanilamide—with contributions by Foerster, Long, Bliss, Mahoney, Van Slyke, Thayer, Cohn, and others too numerous to mention here. All of these methods are still in the experimental stage but each has definitely proved its value under certain conditions.

All types of gonococcus infections were curable in most cases by the older methods, but treatment was tedious and often uncertain of results. Since gonorrhea is potentially infectious until cured, methods which give quicker results were desirable, both from the standpoint of cure and of prevention of spread of infection. The lack of such speedy methods of rendering gonorrhea non-infectious was one of the causes of apathy of health officers with regard to gonorrhea. The problem seemed both stupendous and hopeless to many. The vital thing in recent progress is that the newer methods of treatment shorten the time required for satisfactory results; that is, cure of the disease and cessation of spread of infection. The newer methods also give satisfactory results

in a larger percentage of cases treated.

Robert Lewis observed, as have many others, that girls having gonococcal vaginitis apparently "outgrew" their infection when they had passed through the anatomical and physiological changes collectively called puberty. The vaginal mucosa during puberty becomes thicker, tougher, and more resistant to infection. Lewis considered that if he could induce these changes in little girls having vaginitis, perhaps the infection would be cured. He found that estrogenic substances produced the desired change in vaginal epithelium first in experimental animals and then in girls; and that, as he anticipated, on discontinuing the use of the substance the vaginal mucosa returned to its normal infantile type with no deleterious residual effects and the gonococcal infection disappeared. It was later shown that probably not only the change in epithelium itself but the concomitant change in the pH of the vaginal secretion from the neutral or alkaline side to the acid side, brought about the cure of vaginitis. The estrogenic substance is now generally administered as a vaginal suppository.⁵ The treatment which seems most convenient and popular is a capsule or half a suppository containing the equivalent of 1,000 international estrogenic units inserted into the vagina daily at bedtime. This treatment is safe, has no deleterious effects, cures about 63 per cent of cases,⁶ is convenient for home treatment and saves the child from long periods of hospitalization. It constitutes an important advance in therapy, beneficial to the mental and physical welfare of thousands of infected little girls.

"Fever treatment" of gonorrhea is not new. The American Indians used the sweat house for the treatment of gonorrhea probably from the time they acquired this disease from the white man. Wagner Jauregg, in his early ex-

periments, noted that fever benefitted gonococcal urethritis as well as dementia-paralytica in his patients. Kumer,⁷ at Innsbruck, for more than 18 years has been treating stubborn cases of gonorrhea by means of malaria and has been obtaining excellent results, especially in women.

Many different means of producing fever temperatures for the treatment of gonorrhea have been used but they can be divided into the two groups of which typical examples are mentioned above; namely, physical means like the Indian sweat house, and physiological means like Wagner Jauregg's malaria. I once asked Wagner Jauregg what was his preference among the various methods of producing fever temperatures for the treatment of gonorrhea and syphilis. He replied, "Any kind of fever is good for these diseases, but all are not equally good for the patient nor equally convenient, controllable and safe." Unless methods have changed since I last studied this subject in Europe in 1935, malaria is still the method of choice where fever is used for the treatment of either syphilis or gonorrhea. In the United States, however, more attention has been given to physical means of elevating temperature. Among the most popular today are: (1) the Kittering hypertherm using hot moist air (just as the Indians do in their sweat houses); (2) radiant heat as employed in the cabinet devised by Carpenter and Warren; and (3) high-frequency shortwaves, and a combination of high frequency and diatherm as employed by Bierman.

The work of Carpenter and Warren⁸ is among the most outstanding in the use of artificially induced fever in the treatment of gonorrhea, because of the scientific method employed. They first isolate the strain or strains of gonococcus infecting the patient; they next determine the thermal death time of the particular strain at a temperature of

106.7° F.; they then place the patient in the cabinet, and under the most painstaking medical and nursing supervision they raise the patient's temperature to 106.7° and maintain it at this level for the indicated period of time; or, if this is found to be dangerous, for a somewhat shorter period of time. The great majority of patients (87 per cent) were cured, as determined by most careful clinical and bacteriological studies, after one treatment of 6 to 27 hours' duration.⁹

Other methods of fever treatment of gonorrhea are not so elaborate nor so scientific. They apply heat in one or more sessions in the fever cabinet for fixed periods of time and at fixed temperatures. It is significant, however, that all types of artificial fever treatment give good results in gonococcus infections.

What is the mechanism of cure of gonorrhea by active or passive fever temperatures? It may be that the temperatures attained kill the gonococcus. In the method used by Carpenter and Warren, the gonococcus may be literally "parboiled." It may be that fever stimulates the defense mechanism of the body or injures the gonococcus so that the defense mechanism can more effectively attack the invader. This is probably true of malaria treatment where very high temperatures are not attained but where results are excellent. The mechanism of cure may be some combination of these factors, or some other factor as yet unrecognized.

However fever therapy acts in the treatment of gonorrhea, it is a valuable addition to our armamentarium and has, I believe, come for a long stay, because: (1) It cures, even in one day, in many cases, where the Carpenter and Warren method is used; (2) it cures highly recalcitrant complications in many instances; and (3) used in conjunction with other treatment, it cures even a larger percentage of stubborn

cases. The disadvantages of the fever treatment are: (1) It is not without danger; (2) it is a very mean experience for the patient; (3) it requires hospitalization and highly specialized medical and nursing care; (4) and consequently, it is expensive but not relatively so when one considers the costs of surgical intervention in many complications.

Sulphanilamide is the name given by the Council on Pharmacy and Chemistry of the American Medical Association to "para-amino-benzene-sulphonamide" or "para-amino-phenyl-sulphonamide." Foerster, on May 17, 1933, made the first report of medical use of sulphanilamide when he presented to the Dermatological Society of Dusseldorf, Germany, the remarkable therapeutic results obtained by the administration of this drug in a case of generalized staphylococcal infection. Subsequently, sulphanilamide was tried by many others in Germany, France, Great Britain, and the United States, with continuously heightening interest on the part of the medical profession.

The therapeutic value of sulphanilamide may possibly prove, when at last its value is established, to be comparable with that of salvarsan, quinine, or other previously known specifics. The drug is given by mouth and by hypodermoclysis and sometimes intrathecally. Its mode of action is not understood but the suggestion has been advanced that sulphanilamide may dissolve the capsules of various cocci or in some way make them more vulnerable to bactericidal substances present in the serum.^{10, 11}

Apparently, sulphanilamide has specific value in the treatment of many coccal infections in humans. Not only the staphylococcus, streptococcus, meningococcus, and the pneumococcus, but also the gonococcus appear to be susceptible to the attack of this drug. Its scientific use in the treatment of gono-

coccal infections has not passed the experimental stage, though thousands of doses are sold daily over drug store counters without physicians' prescriptions. So far as serious studies have progressed, they indicate that sulphanilamide is a potent but, in the doses necessary for therapeutic results, a somewhat dangerous remedy for gonorrhea.

Cases of gonorrhea treated as bed patients under careful medical supervision require large doses of sulphanilamide given at frequent intervals throughout the 24 hour day for several days in order to obtain satisfactory results. Apparently about 84 per cent of cases thus treated have been cured, but too few cases have been followed for adequate periods to permit definite statements as to the percentage of ultimate cures. Of acute cases, 76 per cent were apparently cured and of chronic cases, 97 per cent were apparently cured by sulphanilamide therapy. Results in outpatient services have thus far been less satisfactory. About 55 per cent of ambulatory patients were apparently cured on the basis of clinical and bacteriological findings, in a group studied at the New York City Department of Health.

The reasons for the substantially better results in bed treatment as compared with ambulatory treatment seem to include the following: (1) bed rest is beneficial in any treatment of acute gonorrhea; (2) the control of the intake of fluids is difficult in ambulatory patients; (3) the ambulatory patient may not take his medicine regularly and in the proper doses.

At the best, taking all cases as they come, some 15 or 20 per cent do not respond to treatment, but an analysis of cases indicates that chronic cases do much better with sulphanilamide than acute cases. This may be because sulphanilamide supplements and aids the body's own defense mechanism and

gives the best results if administered after the defense mechanism has already swung into action.

In order to obtain satisfactory results in the treatment of gonorrhea, large doses of sulphanilamide must be given. Mahoney, Van Slyke, and others¹² gave nearly 8 grams of sulphanilamide per day for several days and then reduced the dose, in any case giving the drug at 4 hourly intervals. Somewhat smaller doses are given to ambulatory patients. In both types of cases water is limited to 1 or 1½ liters per day. It has been observed that if improvement does not occur in the first 5 days of treatment, the chances of subsequent satisfactory results by this method are poor and the treatment with sulphanilamide may as well be discontinued.

Not only gonorrhea in the adult but vaginitis in little girls is apparently cured by sulphanilamide. The results of sulphanilamide treatment of gonococcal vaginitis are believed to be about the same as those obtained by the use of estrogenic substances. Gonococcal infections of the eye also appear to do well with sulphanilamide administered as systemic treatment in addition to the standard local treatment.

The therapeutic dose and the toxic dose of sulphanilamide are perilously near to each other. And the toxic manifestations of the drug are numerous and sometimes serious. Among the gravest is acute hemolytic anemia. Common manifestations of intoxication, one or more of which are observed in many thoroughly treated cases, include photosensitive eruptions resembling the measles rash, cyanosis, acidosis, dizziness, headaches, shortness of breath, diarrhea, general depression, and ringing in the ears.

Some of these toxic manifestations can safely be ignored, others can be successfully combated by the physician, but some demand instant withdrawal

of the drug. The precautions which should be taken in order to attain the full therapeutic effect of sulphanilamide and at the same time avoid serious complications include, in addition to daily clinical supervision, frequent estimation of the concentration of sulphanilamide in the blood, hemoglobin estimation, and cell count including a differential count of the white cells. Thus sulphanilamide can only be administered safely by a physician with the assistance of a competent laboratory, preferably with the patient in a hospital.

Recently, the press of the whole country has carried stories of deaths attributed to the administration of a preparation called "Elixir of Sulphanilamide." At this writing 69 deaths have been traced to this preparation. It is believed that not the sulphanilamide itself but an adjuvant called "diethylene glycol" which was used in this mixture was responsible for these fatalities, but this experience emphasizes the great danger that may accompany the use or prescription of untried and unapproved preparations. The Board of Health of New York City has forbidden the sale of sulphanilamide except on the prescription of a licensed physician.

While nothing in the long and gloomy history of gonorrhea has aroused hope of its eventual conquest like the discovery of sulphanilamide in its treatment, there are, let us not forget, many difficulties. Sulphanilamide sometimes causes symptoms to disappear while the patient still remains infectious with gonococci in the prostatic and other secretions. Haphazard, unscientific treatment methods will doubtless lead to many still infectious cases being turned loose to spread the disease, just as in the past. Again, we are faced with the difficulty that though best results are obtained by bed treatment, beds are, in fact, available for only a small fraction of existing cases. These do

not seem to be insuperable obstacles. Better trained, more conscientious physicians can overcome the first difficulty, and education and a reasonable hope of success can lead taxpayers to provide the necessary beds. Also the comprehensive experimental work now in progress may develop better methods for ambulatory treatment.

Where, then, do we stand today with regard to gonorrhea? We have three new methods of treatment of gonococcus infections. Each of these forms of treatment apparently gives quicker and better results in the type of cases to which they are adapted. Patients seem to be more speedily cured and made non-infectious. Once we have perfected these newer methods, our problem would seem to be to make these newer, more effective means of treatment generally available so that gonorrhea may be cured and rendered non-infectious *speedily*. We can then attack gonorrhea along lines quite similar to syphilis and tuberculosis; namely, find the cases and render them non-infectious by treatment. When this can be done promptly in a large proportion of cases brought under medical supervision, it will be necessary to mobilize public health resources for an active medical attack on gonorrhea.

Meantime we should not forget that to avoid infection with any disease is better than to be cured of it; and that our educational, preventive program should be pushed even more vigorously than before.

I cannot conclude this paper without referring to medical and administrative research problems now being studied in the New York City Department of Health. In the purely medical field, we are studying the biology of the gonococcus and the effects of drugs in experimental animals, Dr. Alfred Cohn having discovered in a brilliant piece of work a method of infecting mice.¹³ Cohn has also improved the methods of stain-

ing the gonococcus for microscopic examinations and has developed a more satisfactory culture method. Our administrative studies in Staten Island are testing epidemiologic and case-holding procedures; and we are serving Staten Island physicians by offering them the Kline finger blood test for routine application in their offices. Also on the administrative side, the enactment of new and more satisfactory laws requiring pre-marital and prenatal examinations has brought a large additional number of individuals under medical supervision.

On the whole, one may conclude that advances during the last 3 years have carried us a long way in the right direction. Further progress on all aspects of syphilis and gonorrhea control can be expected as one of the results of the recent federal appropriations for this purpose.

REFERENCES

1. Paget, P., and Moore, J. E. Syphilis, A Review of Recent Literature. *Arch. Int. Med.*, 60:887-942, 1937.
2. Thomas, R. B., and Bayne-Jones, S. Survey of Research on the Gonococcus and Gonococcal Infections. *Am. J. Syph., Gonorr. & Ven. Dis.*, supplement, 20 (Jan.), 1936.
3. Clarke, C. W. Control of Syphilis and Gonorrhea in the Scandinavian Countries and Great Britain. *Am. J. Syph., Gonorr. & Ven. Dis.*, part 2, 20 (July), 1936.
4. Harrison, L. W., and others. Report on Anti-Venereal Measures in Certain Scandinavian Countries and Holland. *Reports on Public Health and Medical Subjects*, No. 83. London, His Majesty's Stationery Office, 1938.
5. Lewis, R. M. Study of Effects of Theelin on Gonorrheal Vaginitis in Children. *Am. J. Obst. & Gynec.*, 26:593-99 (Oct.), 1933.
6. Lewis, R. M. Effects of Theelin on Human Vaginal Mucosa. *Ibid.*, 29:806 (June), 1935.
7. Jacoby, A., and others. The Treatment of Gonococcal Vaginitis by Estrogenic Hormone. Unpublished data.
8. Kumer, Leo. Recent Results in the Study of Gonorrhea. *Medical Times*, 65:387-391 (Aug.), 1937.
9. Carpenter, C. M., and Boak, R. A. The Thermal Death Time of the Gonococcus at Fever Temperatures. *International Conference on Fever Therapy. Fever Therapy; abstracts and discussions of papers*. Hoeber, New York, 1937, p. 161.
10. Warren, S. L. The Thermal Death Time Theory Tested in 100 Cases of Gonococcal Infections at 41.5° C. (106.7° F.). *Ibid.*, p. 162.
11. Warren, S. L., Scott, W. W., and Carpenter, C. M. Artificially Induced Fever for the Treatment of Gonococcal Infection in the Male. *J.A.M.A.*, 109:1430-34 (Oct.), 1937.

10. Osgood, Edwin E. Culture of Human Marrow. *Arch. Int. Med.*, 62:181-198 (Aug.), 1938.
11. Long, P. H., and Bliss, E. A. The Clinical Use of Sulphanilamide and Its Derivatives in the Treatment of Infectious Diseases. *Ann. Int. Med.*, 11:575-592 (Oct.), 1937.
12. Van Slyke, C. J., Mahoney, J. F., Thayer, J. D. Sulphanilamide Therapy in Gonococcal Infections. *Ven. Dis. Inform.*, 18:417-424 (Dec.), 1937.
13. Cohn, A. The Effects of Sulphanilamide on Gonococci. *Am. J. Syph., Gonorr. & Ven. Dis.*, 20:1 (Jan.), 1938.
- Cohn, A., and Peizer, L. R. Further Studies of the Experimental Gonococcal Infection in Mice and Their Protection by Sulphanilamide. *J. Infect. Dis.*, 63:77-88 (July-Aug.), 1938.

Results of Contact Investigation in Syphilis in an Urban Community*

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ONE of the principal objectives of programs directed toward the control of syphilis is to bring about a reduction in the attack rate of the disease. With the control methods now available this can be best accomplished by decreasing the average period of infectivity, through early anti-syphilitic treatment of persons newly acquiring syphilis. Establishment of easily accessible, well managed syphilis clinics may encourage infected persons to seek treatment earlier than they otherwise would, but a serious obstacle to complete success of this method is offered by the fact that many infected persons are completely unaware of the presence of syphilitic lesions during a period in which these lesions are most highly infective. This is particularly true with regard to females. Moreover, infectious cases of syphilis occur principally among youths and young adults and among the least well informed members of the

community. It is of the utmost importance, therefore, that the syphilis control program should include adequate facilities for seeking out persons who are potential sources of infection in order that they may be brought under medical care and rendered non-infectious as promptly as possible.

The most practical method of discovering potential sources of infection is contact investigation, which may be defined as the attempt to identify and bring under medical observation persons who have been in intimate contact with an individual known to have syphilis. Although contact investigation has become an established part of the syphilis control program in the United States, few data are available on the actual results, in terms of new cases of syphilis discovered, that are likely to be achieved. It is evident that incalculable personal values, both on the part of the patient and of the medical personnel, may play an important rôle in determining the results in a given clinic or community. Nevertheless, it seems desirable to analyze the results obtained in various types of communities with a view to establishing an average level of accomplishment for

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this phase of the control program. As one step in this direction there will be presented the results of contact investigation in a series of 247 patients with infectious syphilis admitted to the Syphilis Clinic of The Johns Hopkins Hospital.

From the work of Munson,¹ Smith and Brumfield,² L. B. Ingraham,³ N. R. Ingraham,⁴ Kimbrough, Cowgill, and Bowerman,⁵ and Clark and Sargent,⁶ as well as from the accumulated experience of workers in many syphilis clinics, the practicability of contact investigation has been established. It is difficult, however, to obtain from these papers, with a few exceptions, an estimate of the number of new syphilis cases brought under treatment in relation to the number of original cases studied. It is true that useful data are available on the number of contacts examined, and on various methods employed in bringing these individuals under medical care; but the most reliable measure which can be widely applied would seem to be a ratio based on the number of all previously unrecognized cases of syphilis among contacts to the number of original cases comprising the study.

N. R. Ingraham,⁴ reporting the results of contact investigation from two clinics in New Jersey, found that in one clinic, investigation on 70 cases of early syphilis resulted in the discovery of 25 additional cases of syphilis, which is a ratio of 36 contact to 100 original cases. In the other clinic contact investigation on 65 patients with early syphilis yielded 15 new cases of syphilis, which is a ratio of 23 contact to 100 original cases. Clark and Sargent⁶ in a series of 431 original or initial cases of early syphilis succeeded in locating and examining 275 persons who were named as contacts. Among this number, however, there were only 52 cases of syphilis which were previously unrecognized and untreated.

Of these, 45 were among individuals with presumably infectious syphilis. Thus in this series the result of contact investigation in terms of previously unknown cases of syphilis was approximately 12 contact for each 100 original cases.

SOURCE OF MATERIAL AND METHOD OF STUDY

The material on which this paper is based comprises 247 patients with primary and secondary syphilis admitted consecutively to the Syphilis Clinic of The Johns Hopkins Hospital between September 1, 1936, and June 30, 1938. These patients will be designated "original cases." Only patients who applied voluntarily for admission and who had received no treatment prior to admission are included in the study. Patients with primary and secondary syphilis are designated "infectious cases" on the assumption that they were potential sources of infection in the community. For comparative purposes the results among a group comprising 87 colored patients between the ages 14 and 24 years, inclusive, with latent syphilis will be presented. With few exceptions all the original patients resided within the limits of Baltimore City.

Contact investigation was carried out in the following manner: The clinic physician in charge of the original patient attempted to obtain the names and addresses of persons who might have infected the patient or to whom the patient might have transmitted the disease. Included as contacts were only persons who had been in direct and intimate physical relationship with the original patient, such as by sexual intercourse, by kissing, or by sleeping in the same bed. In most instances exposure was through sexual intercourse. The patient was then referred to the clinic social worker who attempted to secure additional data on sexual and house-

hold contacts. If the contact named was living in the home as a marital partner of the patient, whether or not the couple were legally married, the contact was designated as a "marital contact." If the contact was not living in the home with the patient, the individual was termed a "non-familial" contact. A few persons, not marital contacts, who had been in intimate contact with a patient within the home, were also examined. These have been designated "household contacts."

The information regarding contacts obtained from patients proved to be of varying grades of usefulness. In many instances names and addresses, later proved accurate, were obtained. Contacts were frequently located when either or both the name and address were incomplete. In contrast to these, however, patients frequently referred to individuals as their contacts but gave identifying data so incomplete that no further investigation was possible. For the purpose of this study a contact was considered "named" if sufficient data were available to enable the social worker to start a search for the individual. Contacts residing outside Baltimore City or its suburbs are not included in the study, although efforts were made through the state health department concerned to have such contacts examined. It should be emphasized that perhaps the most important part of contact investigation is carried out in the clinic. Time and patience devoted to obtaining accurate and complete information from the original patient will save many home visits and much time in bringing the patients' contacts under observation.

The patient was asked to give each contact named a printed card requesting the contact to report promptly to this or some other clinic or to his family physician for examination. If the patient refused to do this or if a check of these agencies within a few

days revealed that the contact had not reported, the social worker made a visit to the contact's home or place of employment in order to urge him or her to report. If one visit was not successful, frequently others were made. The contact was approached tactfully without the name of the original patient being used, and it was rare that the efforts of the social worker were resented by the person named as contact or by the patient naming the contact.

Contacts upon whom information with regard to syphilis was obtained have been divided into four groups, as follows: (1) infectious cases, (2) latent cases, (3) syphilis known previously, (4) non-syphilitic. The group of infectious cases comprises those with primary or secondary syphilis. The group of latent cases comprises persons in whom a diagnosis of syphilis was made on the basis of a positive serologic test of the blood but who presented no manifest lesions of the disease. This group also includes a few persons found upon examination to have syphilis but in whom no details regarding the stage of the disease were available. The group designated "syphilis known previously" comprises persons named as contacts who were found to be already under treatment for syphilis or to have been treated at some previous time. As a rule, information on these persons was obtained from health department or clinic records. The non-syphilitic group comprises those persons found not to have syphilis. As a rule the last observation on these persons was several months after the original patient had been rendered non-infectious by treatment.

When a contact brought into this clinic was found to have infectious syphilis an effort was made, in turn, to identify and examine his own contacts. These infected contacts were not counted as original cases. Among the contacts of contacts were only a small

number with syphilis (11 in all), and these have been included in the analysis of the main group of contacts.

One practical difficulty encountered in contact investigation was that concerned with determining the probable period of infectivity in the original case. This was particularly true with regard to female patients. Often, it could not be determined accurately whether a contact named had been exposed to the original patient during or before the period of infectivity. No attempt has been made, therefore, to divide the contacts with regard to whether exposure was antecedent or subsequent to infection of the original patient. Since we are here interested principally in the number of new cases of syphilis brought to light through contact investigation, the number of contacts named or examined, or the time of exposure to the original case is of secondary importance. We wish to stress the end results in terms of

sources of infection, rather than the mechanism of arriving at this result.

RESULTS OF CONTACT INVESTIGATION AMONG INFECTIOUS CASES

The distribution of original cases by race and sex, the number of these patients naming contacts, and the total number of contacts named are shown in Table I. Likewise shown are the distribution of the contacts according to the relationship to the original case and the number of contacts examined, together with their distribution according to diagnostic classification. For each race and sex are shown the ratio of infectious cases discovered, and of all cases of syphilis newly discovered, to original cases. These ratios may be used as an index to the actual results achieved by contact investigation.

For the entire group of 247 original cases there were 322 contacts named. Of these, information regarding syphilis was obtained on 237, which is in the

TABLE I

Result of Contact Investigation in a Series of 247 Patients with Primary or Secondary Syphilis

Data on Original Cases				Data on Contacts							Ratio		
Race and Sex	Number	Number Naming Contacts	Number of Contacts Named	Type of Contact and Number	Diagnostic Classification					Total New Cases	Number of Infectious Contact Cases to 100 Original Cases	Number of Infectious and Latent Contact Cases to 100 Original Cases	
					Number Examined	Infectious Syphilis	Latent Syphilis	Syphilis Known Previously	Non-syphilitic				
White Male	37	23	29	{ Marital 16 Non-Familial 13	15	9	2	0	4	19	41	51	
White Female	17	13	22	{ Marital 8 Non-Familial 13 Household 1	4	1	1	1	1	5	18	30	
Colored Male	85	56	104	{ Marital 20 Non-Familial 84	15	5	5	2	3	36	25	42	
Colored Female	108	86	167	{ Marital 35 Non-Familial 126 Household 6	29	11	8	7	3	54	32	50	
Total	247	178	322		237	74	40	60	63	114	30	46	

ratio of approximately one contact to each original case. Of the 237 contacts on whom information was obtained as the result of contact investigation, 74 were found to have primary or secondary syphilis, which gives a ratio of 30 infectious contact cases to each 100 original cases. In addition 40 other contacts were for the first time discovered to have syphilis, without manifest lesions. Contact investigation, therefore, was responsible, in part at least, for bringing under medical care 114 previously unknown cases of syphilis, approximately two-thirds of which were potentially infectious. The ratio of previously unknown cases of syphilis among contacts was 46 contact cases to 100 original cases.

It is of considerable interest that, of the contacts located, 60 or approximately one-fourth were found already to be under treatment for syphilis or had been under treatment previously. Obviously, these cases cannot be credited to the results of contact investigation. Rather, they form a group in which contact investigation was inadequately carried out by some other treating agency.

Approximately one-fourth of the contacts examined proved to be non-syphilitic after adequate periods of observation, despite the fact that they were named as contacts of patients with known infectious syphilis. It is not known whether these persons represent instances in which exposure occurred only prior to onset of the disease in the original patient, or whether other factors affecting communicability were operative. Suffice it to say that the information obtained from the original patient did not permit of an accurate prediction regarding the result of examination in the contact.

There was no pronounced difference in the results of contact investigation obtained among whites and negroes or

in the two sexes of each race. The results appear to be poorer for the group of white females than for the other groups, but the numbers are small and the differences are not statistically significant. Indeed, any of the differences noted could well have been due to chance alone.

TIME ELAPSING BETWEEN ADMISSION OF ORIGINAL CASE AND EXAMINATION OF CONTACTS

The value of contact investigation will probably be in direct proportion to the length of time by which the infectious period is shortened in those contacts who have syphilis. It is exceedingly difficult to obtain precise data on this point, but the available evidence suggests that many infected contacts were brought under medical observation sooner than if they had been left to apply voluntarily for medical care.

Among white contacts, excluding those already under treatment, 56 per cent of those found to be syphilitic came under medical observation within 1 week of the date of admission of the original case, and 78 per cent within 4 weeks. The apparent cause and effect relationship is too strongly evident here to be ignored, particularly in view of the fact that many infected contacts were unaware of the presence of lesions. Among colored contacts 33 per cent of those found to be syphilitic, and not already under treatment, came under observation within 1 week, and 50 per cent within 4 weeks. Of interest is the fact that among both white and colored contacts those eventually proved to be non-syphilitic did not report as promptly, on the average, as did those with syphilis.

Another finding, which strongly suggests that the period of infectivity was materially shortened in some infected contacts, is the fact that in 2 male contacts and 5 female contacts the first

clinical or serologic evidence of syphilis developed after the individual came under medical observation. Moreover, in 13 male and 10 female contacts the disease was in the primary stage when the individual came under the care of a physician. In this series of infectious contact cases, then, 45 per cent of the males and 42 per cent of the females came under medical care before or during the primary stage of the disease. Of approximately 6,000 infectious cases, including contact cases, admitted to the Syphilis Clinic of the Johns Hopkins Hospital between 1918 and 1936, 34.1 per cent of the males and 9.6 per cent of the females were in the primary stage of syphilis. It would seem, therefore, that females in particular were reaching the clinic earlier because of contact investigation.

CORRELATION OF VARIOUS SOCIAL FACTORS WITH THE RESULTS OF CONTACT INVESTIGATION

In the foregoing section the results of contact investigation have been computed in terms of the number of original cases in the series. In this section some of the social factors which may affect these results will be discussed. In general the percentages will be based on the number on whom information was obtained, but it must be noted that such figures have significance only when related back to the number of original cases.

A slightly higher proportion of female original patients named one or more contacts than did the males of either race (79 per cent and 65 per cent, respectively). White patients named a proportionately smaller number of contacts than did colored patients, but of the contacts named there was no significant difference in the proportion of each race that was examined (80 per cent of the white contacts and 72 per cent of the colored). Of the contacts

upon whom information was obtained a smaller proportion of white contacts were known previously to have had syphilis than was the case among colored contacts (14.5 per cent and 20 per cent, respectively), but the proportion of non-syphilitic contacts was about the same in each group.

A larger proportion of the white original cases named marital partners than did the colored original cases (44.5 per cent and 28.5 per cent, respectively). Of the marital contacts named a somewhat lower proportion of the colored was examined as compared with the white (70 per cent and 80 per cent, respectively), but the differences are not statistically significant. A lower proportion of non-syphilitic individuals was found among the entire group of marital contacts examined than among the group of non-familial contacts (11.1 per cent and 30.5 per cent, respectively).

RESULTS OF METHODS UTILIZED IN CONTACT INVESTIGATION

In the series of patients under study the approach to the contact was through a card or letter transmitted by the original patient, through a letter posted to the contact, or through a visit by the clinic social worker or nurse. Since in individual instances there was some overlapping of these methods, an accurate appraisal of the results of each cannot be made, but the following observations may be noted.

Among white contacts 83 per cent of the marital and 44 per cent of the non-familial contacts reported as the result of a contact card alone. Among colored contacts, 60 per cent of the marital and only 12 per cent of the non-familial contacts reported as a result of a contact card. One or more home visits were made to 44 per cent of the white non-familial contacts and

to 81 per cent of the colored non-familial contacts. Possibly had not home visits been made promptly, usually within 2 weeks of admission of the original case, a larger proportion of contacts would have reported solely through the efforts of the original patient, but no definite data are available on this point.

The method of employing a letter by post to the contact has not been used extensively because of the general impression among the clinic personnel that it is not an effective method in this community. In rural areas it may be much more useful and may greatly reduce the number of visits required of the social worker or public health nurse.

NUMBER OF HOME VISITS MADE

For all of the 262 contacts named and not already known to another agency 258 home visits were made, or slightly less than one visit per contact named. Of the entire group of contacts, 177 were examined and 258 visits were made, giving a ratio of 1.5 visits per contact examined. Since 74 infectious contacts were brought under medical care, this gives a ratio of 3.5 visits per infectious case discovered. The ratio of visits to the total number of syphilis cases discovered is 2.2 visits per case.

RESULTS OF CONTACT INVESTIGATION
AMONG LATENT CASES

For comparative purposes the results of contact investigation among a group comprising colored persons with latent syphilis between the ages 14 and 24 years, inclusive, have been analyzed. These cases represent consecutive admissions to the Syphilis Clinic of The Johns Hopkins Hospital during the period covered by the study. (There were too few white patients of similar ages to include in the analysis.) Of 87 original cases 60 named 83 contacts, and of the contacts named 46, or 55 per cent, were examined. Among this number 3 cases of infectious syphilis and 11 cases of latent syphilis were discovered; 13 contacts were already known to have syphilis and 19 were found to be non-syphilitic. The ratio of contacts with infectious syphilis to original latent cases is approximately 3:100 and of all contacts with previously unrecognized syphilis 16:100. A comparison of the results among latent colored syphilitics with those among white and colored infectious original cases is shown in Table II. The results of contact investigation among this group of young latent syphilitics is not strictly comparable to the results among the group of original infectious cases, for undoubtedly a greater amount

TABLE II

Comparison of Results of Contact Investigation on Groups of White and Colored Original Patients with Infectious Syphilis and Young Colored Patients with Latent Syphilis

Original Cases			Contacts			
			Infectious Cases		All Previously Unrecognized Cases of Syphilis	
Type	Race	Number	Number	Ratio to 100 Original Cases	Number	Ratio to 100 Original Cases
Infectious	White	54	18	33	24	44
Infectious	Colored	193	56	29	90	47
Latent	Colored	87	3	3	14	16

of energy and enthusiasm was put into investigation of the contacts of the latter group. Nevertheless, the results suggest conclusions which are in accord with the prevailing opinion among syphilologists, namely, that not many sources of infection in the community will be discovered through contact investigation of latent syphilitics. Further studies, however, should be made on this question.

COST OF CONTACT INVESTIGATION

Only a rough approximation to the cost of contact investigation can be made in this series of infectious and latent original cases. Since this is a teaching clinic, postgraduate students have assisted in all phases of the work. Moreover, other duties such as the follow-up of patients delinquent from treatment and social service case work have been intermingled with those related more directly to contact investigation. However, a large part of the burden of contact investigation has been carried by one social worker, and it is conservatively estimated that fully half of this worker's time has been devoted to that work alone.

Computed on an annual salary of \$1,500 for the 22 months covered by the study, the cost of this service was \$1,375. This represents a minimum figure and does not include the cost of transportation, telephone, or postage. Altogether 128 previously unrecognized cases of syphilis were brought under treatment, 114 as contacts of infectious cases and 14 as contacts of latent cases. This figure divided into \$1,375, the cost of the social worker's services, gives the cost per case as approximately \$10. Computed on the same basis, the cost per infectious case brought under treatment was about \$18 (\$1,375 divided by 77).

Whether these figures are high or low in comparison to the cost in other

clinics or health districts is not known, for no other estimates based on the cost per new case brought under treatment are available. In one large urban clinic³ the cost per contact examined was estimated to be \$5.22, but no data are available from that study on the number of contacts found to have syphilis. Perhaps the figures given for our clinic are unduly high due to the fact that this clinic serves also as a teaching center. It would be interesting to have cost estimates derived from clinics devoted more exclusively to the treatment of large numbers of persons with syphilis.

DISCUSSION

One of the important aspects of the syphilis control program is that concerned with the measurements of results achieved by various methods employed in different phases of the program. It is suggested that the results of contact investigation should be estimated in terms of new cases of syphilis brought under treatment in relationship to the number of original cases in the series. Proportions or ratios based on other figures may not be free from sources of error because the number of persons naming contacts and the number of contacts named may vary greatly in different clinics, according to different criteria for designating a contact as "named." For example, personal data available for identifying a contact vary so much that it is often difficult to decide when a contact has been named. Again, it is often exceedingly difficult to estimate the period of infectivity in an original case, hence assigning a person as a contact during the period of probable infectivity of the original case is often a matter of individual judgment. The basic figures used in this study, number of original cases, and number of previously unrecognized cases of syphilis among the

contacts, are easily ascertainable and are not subject to errors of selection.

While the immediate results of contact investigation can readily be measured, it is not possible yet to determine the ultimate results to the community as a whole. Evidence is at hand which indicates that from 1932 to 1937 there was little or no change in the number of new syphilis cases occurring in the Eastern Health District of Baltimore City, from which area many of the individuals in the present study were drawn, despite the fact that good treatment facilities were available during this period. Perhaps energetic contact investigation may help to change this trend. During the past 2 years at least 77 persons who were potential sources of infection in this community were rendered non-infectious fairly promptly after an effort was made to bring them under treatment. It would appear that the average period of infectivity was shortened in this group of cases and there are sound reasons, based on epidemiological principles, for believing that some new cases of the disease were thereby prevented. Whether the results were worth the estimated cost of contact investigation must be at present largely a matter of opinion; it is our opinion that the results achieved in this series of patients were well worth the cost.

SUMMARY

1. In a series of 247 original patients with primary or secondary syphilis contact, investigation is credited with bringing under treatment 114 previously unrecognized cases of syphilis. This is a ratio of 46 contact cases to 100 original cases.

2. Of the contacts examined 74 had primary

or secondary syphilis and were obviously potential sources of infection in the community. The ratio of infectious contact cases to original cases is 30:100.

3. Of the total contacts on whom information was obtained approximately one-fourth were already under treatment for syphilis by some agency at the time the original case was admitted to this clinic. Likewise, approximately one-fourth of the contacts examined proved not to have syphilis.

4. There was no significant difference in the results of contact investigation between white and colored patients or between male and female. Of the contacts examined, 11.1 per cent of the marital contacts were non-syphilitic compared with 30.5 per cent of the non-familial contacts.

5. In a series of 87 original cases comprising young colored adults with latent syphilis, contact investigation yielded 3 previously unrecognized infectious cases and 11 other cases of syphilis.

6. An estimate of the cost of contact investigation in this series shows that each previously unrecognized case of syphilis brought under medical care cost approximately \$10, and each infectious case cost about \$18.

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REFERENCES

1. Munson, W. L. Practicability of Epidemiological Methods in the Control of Syphilis. *A.J.P.H.*, 22:134-140 (Feb.), 1932.
2. Smith, D. C., and Brumfield, W. A. Tracing the Transmission of Syphilis. *J.A.M.A.*, 101, 25:1955-1957 (Dec.), 1933.
3. Ingraham, L. B. The Persuasive Approach with the Infectious Syphilis Carrier, A Study in Public Health Method. *J.A.M.A.*, 107:1990-1995 (Dec. 12), 1936.
4. Ingraham, N. R. Contact-tracing and Case-holding in New Jersey. *Ven. Dis. Inform.*, 19, 3: 61-73 (Mar.), 1938.
5. Kimbrough, R. C., Cowgill, D. M., and Bowerman, E. P. Rural Syphilis, A Localized Outbreak. *A.J.P.H.*, 28, 6:756-758 (June), 1938.
6. Clark, W. T., and Sargent, C. A. Investigation of Early Syphilis. *A.J.P.H.*, 28, 7:807-812 (July), 1938.

Mean Annual Hours of Sunshine and the Incidence of Dental Caries*

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A SURVEY made under the direction of the U. S. Public Health Service covering dental examinations of over 1,500,000 children has been published.¹† It seems worth while to evaluate such extensive data in relation to other factors than those indicated in the *Bulletin*. The data available on seasonable incidence of dental caries^{2, 3} suggest the interesting problem of ascertaining whether or not a correlation can be established between caries incidence and hours of sunshine available per annum. The U. S. Weather Bureau data on hours of sunshine serve as a reliable source of information on the latter variable.⁴‡

The present report covers only a small portion of the projected plan, namely, the 12-14 year age group of the white boys residing in rural and semirural areas of the United States. In the original *Bulletin* the greatest emphasis was placed on city populations. For the present study, we have

chosen the non-city groups (population groups below 5,000), which in many respects are probably more homogeneous than the population of towns and cities with their more variable ethnological groups and more diverse habits of living. There are 94,337 boys of 482 communities of 24 states in this group.

From the original data, the caries incidence per 100 children was determined by totalling the numbers of fillings in the temporary and permanent teeth, the numbers of cavities in the temporary and permanent teeth, and the numbers of extracted teeth, as reported by Mills.⁵ The number of individuals in all 482 community groups was then arranged in a frequency table having class-intervals of 50 cavities per 100 boys (Table I, Column A).

From the grouped data, the arithmetic mean, the standard deviation, and the mean's probable error were determined.* The mean, 353.50 cavities per 100 boys, is many times greater than its probable error, ± 0.295 ; therefore, we can safely assume that the mean value is representative of the hypothetical universe from which the sample is drawn, and that any error

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† Included in this study are additional but unpublished data from the same survey, used with the courtesy and permission of the Surgeon General.

‡ The methods of collecting these sunshine rates are described in the Weather Bureau *Bulletin* 802, U. S. Department of Agriculture, "Instruction for Care and Management of Electrical Sunshine Records," Circ. G., Instrument Division, Fifth Edition, by C. F. Marvin.

* Details of statistical calculations will be furnished those interested. The unpublished data used with the consent of the Surgeon General will also be supplied by the author.

TABLE I

Dental Cavities, per 100 Boys, of 12 to 14 Year Old White Boys, Living in Rural Areas or Towns of Less Than 5,000 Population Which Receive Varying Mean Annual Amounts of Sunshine, in Hours

	A	B	C	D	E
	Total— All Areas	Areas of More Than 3,000 Hours	Areas of 2,999–2,600 Hours	Areas of 2,599–2,200 Hours	Areas of Less Than 2,200 Hours
Number of boys involved	94,337	1,775	48,718	41,013	2,831
Average number of cavities per 100 (arithmetic mean)	353.50 \pm 0.29 (σ = 133.50)	290.50 \pm 1.79 (σ = 112.00)	323.00 \pm 0.36 (σ = 119.00)	375.65 \pm 0.42 (σ = 127.00)	485.75 \pm 2.04 (σ = 161.00)
Difference between means of suc- ceeding "sun- shine hour" groups	(C-B) \rightarrow 323.00 — 290.50 = 32.50 \pm 1.83 (D-C) \longrightarrow 375.65 — 323.00 = 52.65 \pm .56 (E-D) \longrightarrow 485.75 — 375.65 = 110.10 \pm 2.08				

Frequency Distribution of Caries Rates

<i>Cavities per 100 White Boys Aged 12 to 14</i>	A 94,337 Boys	B 1,775 Boys	C 48,718 Boys	D 41,013 Boys	E 2,831 Boys
0–49.9	0	0	0	0	0
50–99.9	854	0	854	0	0
100–149.9	2,168	282	1,481	405	0
150–199.9	8,406	138	5,974	2,193	101
200–249.9	12,328	304	6,231	5,793	0
250–299.9	11,415	251	7,596	3,179	389
300–349.9	13,640	202	7,138	6,152	148
350–399.9	13,823	99	6,228	7,275	221
400–449.9	10,708	438	5,603	4,290	377
450–499.9	9,583	43	4,171	5,086	283
500–549.9	6,031	18	1,637	3,923	453
550–599.9	2,159	0	1,347	692	120
600–649.9	1,633	0	419	949	265
650–699.9	492	0	0	492	0
700–749.9	484	0	39	148	297
750 & above	613	0	0	436	177

introduced by chance or accidental sampling is negligible.^{6, 7, 8}

From the official weather map furnished by the U. S. Weather Bureau "the mean annual amounts of sunshine, in hours" for various sections of the United States were determined. The observations from which this map is made are recorded at some 90 meteorological stations. For this study, these sunshine values are arranged into four divisions: (a) those areas having more than 3,000 hours; (b) those having

2,999 to 2,600; (c) 2,599 to 2,200; and (d) less than 2,200 hours of sunshine per year respectively.

Frequency distributions of caries rates were made according to the mean annual sunshine value in hours for the community in which the children resided (Table I, Columns B, C, D, and E).

The arithmetic mean and the standard deviation with their probable errors were determined for each group. The means are 290.50 ± 1.79 cavities per

100 boys for the group living in localities having more than 3,000 hours per annum; 323.00 ± 0.36 , 375.65 ± 0.42 and 485.75 ± 2.04 in the B, C, D, and E groups respectively. In each case, the relations between the successive means and their probable errors is so great as to make it safe to assume that the mean values are representative of the respective hypothetical universes from which the samples are taken. The locations of the areas having the various mean annual amounts of sunshine in hours, are shown in Figure I. The mean caries incidence for those areas is graphically expressed in Figure II.

The probable errors of the differences between these various means have been determined. The difference between the means of the B and C groups is 32.50 ± 1.83 ; of the C and D groups 52.65 ± 0.56 ; and the D and E groups 110.10 ± 2.08 .

The lowest value is that between the B and C groups, but there the difference between the means exceeds the probable error of that difference 17.7 times.*

DISCUSSION

Jessen has written, "The conception that the weather exerts an influence on health of mankind is as old as the treatment of illness itself" (translation).⁹ Emerson has reported the influence of sunshine on growth of children and has noted that the incidence of acute infectious disease is lowest during the season having the greatest amount of sunshine.¹⁰ The relation of the seasons and dental caries incidence has been reported by McBeath and Zucker² and Erpf.³ In both investigations marked decrease in caries incidence was found in the months of greatest sunshine,

* The chances are less than 1,000,000,000 to 1 that the observed difference between any two of the means is due to chance distribution. See: Sherman, Henry C. *Chemistry of Food & Nutrition*, Appendix D, Macmillan, 1937.

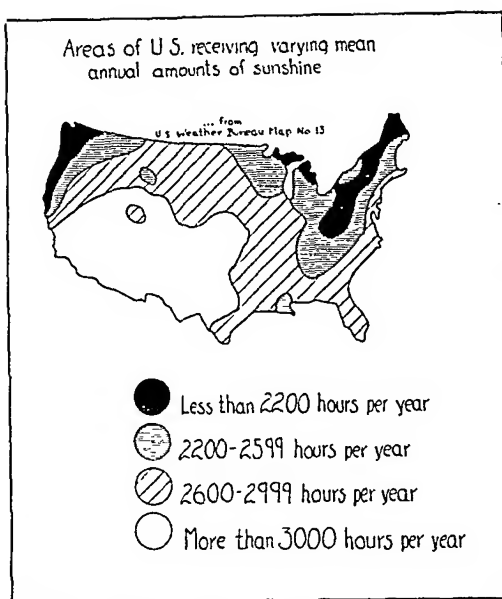


FIGURE I

when compared with those months having less sunshine.

Examinations of Indian children by members of the U. S. Public Health Service¹¹ seem to establish that those resident where the sun shines the greatest number of hours per year have

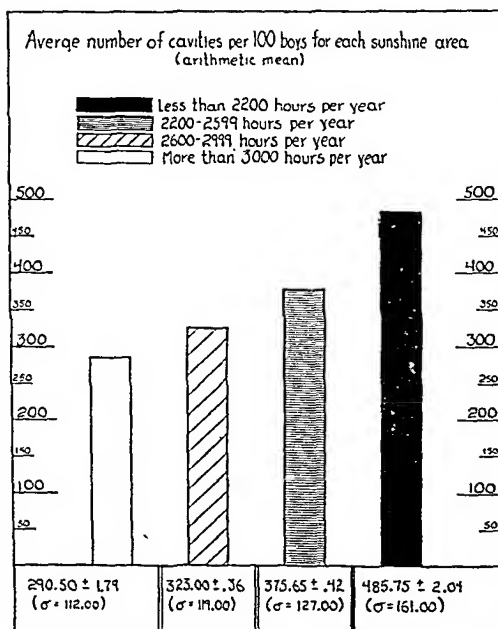


FIGURE II

a coincidental decrease in caries incidence over those living in areas of less sunshine. Moore and associates¹² found that 5 year old children of San Diego, Calif., having 3,000 hours of sunshine per year, had only one-half as much dental decay as children of the same age of Portland, Ore., with only 2,000 hours per annum.

The statement of Bunting¹³ that sunshine has no correlation with dental decay is at variance with the results obtained in this statistical study of 94,337 children living in various sunshine areas.

SUMMARY

1. The mean caries incidence of 94,337 white boys, 12 to 14 years of age residing in rural and semi-rural areas of 24 states during 1934-1935, was 353.50 per 100 boys.

2. The mean caries incidence of these boys varies inversely with the hours of sunshine prevailing at their places of residence. The group residing in the area having over 3,000 hours of sunshine per year had 290.50 cavities per 100 boys; the 2,600-2,999 hour group, 323.00; the 2,200-2,599 group 375.65; and the group with less

than 2,200 hours 485.75 cavities per 100.

3. The data presented suggest an inverse relationship (not necessarily causal) between the caries-attack rate among samples of white boys 12 to 14 years of age, and the mean annual number of hours of sunshine recorded for the places of residence of these children.

REFERENCES

1. *Pub. Health Bull.* 226, 1936.
2. McBeath, E. W., and Zucker, T. F. The Role of Vitamin D in the Control of Dental Caries in Children. *J. Nutrition*, 15, 6 (June), 1938.
3. Erpf, S. F. Dental Caries and Parodontal Disturbances, II, The Seasonable Incidence of Dental Caries. *J. Am. Dent. A.*, 25, 681-682 (May), 1938.
4. U. S. Weather Bureau Map No. 13.
5. Mills, C. A. Factors Affecting the Incidence of Dental Caries in Population Groups. *J. Dent. Research*, Oct., 1937.
6. Chaddock, R. E. *Principles and Methods of Statistics*. Houghton, Mifflin, 1925.
7. Pearl, Raymond. *Introduction to Medical Biometry and Statistics*, 2nd ed. Saunders, 1930.
8. Gordon, Samuel M. Dental Science and Dental Art, Chapter XXII, *Statistical Methods in Dentistry*, by W. M. Gafafer. Lea and Febiger, 1938.
9. Jessen, F. Witterung und Krankheit. *Suzchr. Hyg. u. Infekt-Krankh.*, 21:287, 1896.
10. Emerson, Haven. Seasonal Variation in Growth of School Children. *J.A.M.A.*, 89:1326 (Oct.), 1927.
11. Klein, H., and Palmer, C. *Pub. Health Bull.* 239, 1937.
12. Moore, C. U., Brodie, and others. Failure of Abundant Sunshine to Protect Against Rickets. *Am. J. Dis. Child.*, Dec., 1937.
13. Bunting, Russell. *J. Michigan State Dent. Soc.*, Mar., 1937.

Epidemiology of Epidemic Encephalitis in California*

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EARLY in the summer of 1937 increases in the incidence of poliomyelitis and encephalitis were noted in the San Joaquin Valley area of California. While the number of cases was not great, many were severe and the mortality rate was high. It was assumed at first that we were having an unusually high incidence of the encephalitic form of poliomyelitis, but as time went on it became evident that we were dealing with a disease entirely distinct from poliomyelitis which from the clinical standpoint corresponded closely to the outbreak experienced in St. Louis in 1933.

The medical profession was unaware of the presence of the St. Louis virus in the state—consequently the true nature of the early cases was not suspected. These were often diagnosed as poliomyelitis, polioencephalitis, epidemic encephalitis, epidemic meningitis, aseptic meningitis, lymphocytic or choriomeningitis, depending upon the predominating symptoms. For this reason the exact number of cases was difficult to ascertain as some of the

above diseases are not reportable in California. Tuberculous meningitis was also frequently considered, especially during the early part of the illness. Undoubtedly many of the earlier cases escaped our attention entirely.

The unusually high fatality rate, together with the high incidence of cases manifesting pronounced lethargy, focused our attention on them. Inasmuch as no outbreaks of encephalitis suggestive of the St. Louis type had been recognized in California previously, it was believed that the information accumulated in this outbreak would be of value, even though the epidemic could hardly be considered as of major proportions.

A comparison with past years' experience in poliomyelitis and epidemic encephalitis, Table I, shows a definite increase in the prevalence of the latter in 1937, the number of cases for that year being double the usual expectance.

Clinically, these encephalitis cases were similar to those described by Hempelmann in the 1933 epidemic at St. Louis.¹ They were characterized by profound prostration, sudden onset with high fever, severe headache, backache, chills or chilly sensations, nausea, vomiting, and convulsions were encoun-

* Read before the Epidemiology Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 27, 1938.

tered frequently in children. Mental confusion, apathy, tremors, especially of the tongue and hands, and difficulty in speaking were often noted early in the disease.

The most constant single symptom was fever. This was unusually high, much higher than seen in the typical case of poliomyelitis. Temperatures of 105° and 106° F. were common, even in adults. Sixteen cases showed fever in excess of 106°F., and all but one of these resulted fatally. The exceptionally high fever and profound prostration presented an obvious and striking contrast to the usual case of poliomyelitis. Upon entering the room of these patients the contrast was noticeable. Also, none exhibited the apprehension and dislike at being disturbed so often observed in poliomyelitis with pronounced hyperesthesia. The case of average severity ran a high fever for from 5 to 7 days and dropped by lysis—the usual case returning to normal in from 10 to 15 days.

TABLE I
Epidemic Encephalitis and Acute Anterior Poliomyelitis in California*

	<i>Encephalitis</i>		<i>Poliomyelitis</i>	
	<i>Cases</i>	<i>Deaths</i>	<i>Cases</i>	<i>Deaths</i>
1930	82	57	1,903	157
1931	56	40	293	48
1932	57	38	191	31
1933	44	31	170	14
1934	45	22	3,399	110
1935	66	23	831	67
1936	67	34	388	38
1937	122	51	664	78

* All forms

Headache was a rather constant symptom and usually severe. There was no definite localization characteristic of the disease. Lumbar puncture with removal of fluid usually produced prompt relief of the headache for several hours.

Nausea and vomiting were present at the onset almost invariably in the younger age groups. In very young children convulsions were often noted.

Tremors of the hands, tongue, and lips occurred, especially when the patient was disturbed, was trying to concentrate on questions or attempting to make purposeful movements.

Mental confusion, disorientation, apathy, listlessness, drowsiness, semi-coma, and lethargy occurred in some degree in practically all cases; at least 75 per cent having a very definite lethargy. As a rule lethargy developed within a day or two after onset, becoming deepest at about the 5th to 7th day, gradually decreasing until the patient became practically normal in 10 to 14 days, although some patients continued to have sluggish mental reactions and apathy longer. Often the lethargy was profound and the patient could be aroused only with difficulty. Many of the fatal cases developed a condition undistinguishable from coma out of which they could not be aroused. The lethargy was such that the patient could be aroused and answer questions only to drop off immediately or while making the effort. A few showed no lethargy whatever; on the contrary, these had stages of mild excitement and delirium.

Nuchal pains and neck stiffness were common symptoms. Many complained of pain in the lower back. The neck rigidity was pronounced, a few (13 per cent) even having definite opisthotonos. Thirty per cent had positive Kernigs. The pronounced meningeal symptoms exhibited by some of these patients, combined with rather high cell counts, justified the provisional diagnosis of epidemic meningitis, made so frequently.

There seemed to be nothing uniform about the reflexes. Even in the same individual these varied from day to day. Absence of the abdominal reflexes was common. More often than not the tendon reflexes were exaggerated, sometimes markedly. The plantar reflexes, Gordon, Babinski, and Oppenheim, were quite variable.

Ocular manifestations were rare in contrast to the ordinary forms of encephalitis. Occasionally the patient complained of double vision and blurring. Strabismus and nystagmus were rarely observed. In a few instances reaction to light was sluggish.

Retention or incontinence of urine or feces was observed. Hyperesthesias were very uncommon; few patients exhibited any distress in manipulation of extremities other than in those instances when such manipulation incited tremors and spasticity.

Fifty per cent showed some degree of paralysis, mostly of a spastic nature. Often the patient had a lead-pipe rigidity of the extremities with greatly exaggerated reflexes. Difficulty in swallowing and loss of speech were noted. In most patients, the paralysis was temporary and cleared up with clinical recovery, although a few had a spasticity of all extremities lasting for several weeks, and in 2 this persisted for months. Most of those patients showing absence of reflexes and flaccidity of muscle groups died and these symptoms were noted shortly before death. Some of the recovered cases, however, had a temporary flaccid paralysis involving one or more muscle groups.

While there was considerable variation in the spinal fluid findings, as a rule the fluid was under slightly or moderately increased pressure, usually clear, but occasionally ground glass or slightly cloudy in appearance, with the cell count ranging from normal limits to 1,000 or more. The average count was from 200 to 400 cells with lymphocytes predominating, even up to 100 per cent. Sugar was not reduced and globulin was usually within normal limits or slightly increased. The spinal puncture was followed almost invariably by considerable relief, with less headache and more comfortable rest.

Some patients had extremely virulent

infections resulting in deaths within 4 to 6 days. In this series of 102 cases, 40, or 39.2 per cent, were fatal. This corresponds with a fatality rate of 37 per cent for the Paris, Ill., outbreak in 1932,² 20 per cent in St. Louis, in 1933, and 28 per cent³ in Toledo in 1934. Seventy-five per cent of all our deaths occurred before the 10th day, and 50 per cent before the 7th day. Those surviving over 12 days had a very good chance for recovery.

Epidemiologically, the disease was most interesting, especially from the standpoint of geographical distribution. The cases occurred in the San Joaquin Valley, an agricultural area with extensive irrigation, containing a number of small cities but no large metropolitan areas. Even in this area the cases were distinctly in rural sections. No cases occurred in the mountainous regions; and large population centers, such as San Francisco and Los Angeles, were singularly free from the disease.

The two counties reporting the largest number of cases were Fresno and Tulare, with populations of 150,304 and 84,432, respectively. Table II shows the geographical distribution of the 102 cases. Thus, Los Angeles County with a population of 2,691,707 reported 5

TABLE II
Geographical Distribution of Cases of Epidemic Encephalitis—St. Louis Type and Acute Anterior Poliomyelitis—1937

County	Epidemic Encephalitis	Poliomyelitis
Tulare	29	17
Fresno	28	9
San Joaquin	8	19
Los Angeles	5	245
Santa Clara	5	6
Sacramento	5	17
Kern	5	74
San Diego	4	57
Alameda	3	34
Yolo	3	3
Sonoma	2	5
Contra Costa	1	3
Santa Cruz	1	2
Madera	1	3
San Francisco	1	23
Colusa	1	3
	102	320

cases, while Tulare and Fresno Counties with a combined population of 234,736 reported 37 cases. In these two counties the cases were definitely rural in their distribution, often occurring in individuals living on ranches and in no contact with the public. San Francisco and Los Angeles accounted for only 5 per cent of the cases, although they hold approximately 50 per cent of the population of the state.

The seasonal distribution was similar to that in the outbreaks in the Middle West. The cases were most prevalent during the late summer and early fall—the same season that poliomyelitis was most prevalent. In Table III the distribution by months is shown together with that of poliomyelitis. Eighty-four per cent of the cases of encephalitis occurred during July, August, September, and October, while 80 per cent of the poliomyelitis cases occurred during this same period.

TABLE III
Cases of Epidemic Encephalitis—St. Louis Type and Acute Anterior Poliomyelitis by Months, 1937–1938

Month	Encephalitis		Poliomyelitis	
	Cases	Deaths	Cases	Deaths
1937				
March	1	1	10	1
April	1	..	15	3
May	1	1	22	2
June	3	3	40	6
July	13	7	134	7
August	40	11	157	28
September	22	5	132	12
October	11	4	84	6
November	7	6	36	8
December	2	1	12	5
1938				
January	..	..	9	2
February	1	1	11	1

There were more cases in the younger age groups of this series than were reported in the epidemic in the Middle West, although it is understood that in 1937 an increase in the incidence among the younger age groups in the Middle West was also noted. As indicated in Table IV, 38.2 per cent of the cases occurred in those under 14 years of

age, and this group accounted for 35.0 per cent of the deaths. The highest death rates occurred in the age groups 1–4 and over 55 years, each of such group having a fatality rate of approximately 62 per cent. It is realized that the number of cases involved in this series is too small upon which to base definite conclusions. The exceptionally high fatality rate is undoubtedly due to the fact that mild cases were unrecognized.

TABLE IV
Cases of Epidemic Encephalitis—St. Louis Type By Age Groups

Age	Cases	Deaths	Per cent Fatal	Per cent of Total Deaths
0–1	3	..	....	....
1–4	13	8	61.5	20.0
5–9	13	3	23.0	7.5
10–14	10	3	30.0	7.5
15–19	14	5	35.7	12.5
20–24	11	4	36.3	10.0
25–34	12	4	33.3	10.0
35–44	9	5	55.5	12.5
45–54	8	3	37.5	7.5
55+	8	5	62.5	12.5
	102	40	39.2	100.0

The sex distribution shows nothing significant—58 males, 44 females. Multiple cases in families were rare. In only one family did more than one case occur; there were 3 cases, 2 of which were mild, and all 3 came down within a period of 6 days. Other than this one instance no case could definitely be traced to contact with a recognized or suspected case.

At postmortems the pathological findings were limited chiefly to the brain and cord. In all autopsied cases the brain showed evidence of edema, congestion of the meningeal and intracerebral vessels, small petechial hemorrhages into the cortex and into the meshes of the pia-arachnoid. In many instances, the brain was quite soft and flabby due to the excessive fluid. The microscopic picture was that of an acute non-purulent inflammation throughout the brain and cord, especially in the pons, medulla, and mid-brain, petechial

hemorrhages and intense vascular congestion with cellular infiltration of both nervous tissue and meninges with various types of mononuclear cells, chiefly lymphocytes, and evidences of toxic degeneration of the nerve cells. These findings correspond to those previously reported for the St. Louis virus.⁴

Unfortunately, brain material in condition suitable for virus studies was obtained in only a few instances, and in those, no virus could be demonstrated. The laboratory work was done by B. F. Howitt,⁵ of the George Williams Hooper Foundation, University of California Medical School. In 41 of the cases, virus neutralization studies were carried out by Miss Howitt,⁵ using the viruses of lymphocytic choriomeningitis and the St. Louis type of encephalitis.

In 21 cases the virus of the St. Louis type was neutralized while in no instance was the other virus affected. Inasmuch as blood for the most part was obtained only from the milder and recovered cases, it would seem fortunate that so many positive results were obtained. In one instance blood taken a few hours before death neutralized the virus. As a rule, the blood was collected during convalescence.

That the disease was present in California before 1937 is evident. The sera from two individuals who were not ill in 1937 were found to neutralize the virus. One gave a history of an abortive attack of poliomyelitis in 1935, the other an abortive attack in 1936. Both lived in the same county and had not been out of the state. As reported,⁶ these individuals may have suffered attacks of encephalitis rather than poliomyelitis, or they may have at some time or other been exposed to the virus and developed sub-clinical infections.

An attempt was made to follow up these patients and determine the extent of after-effects. In spite of the marked toxicity and the severity of the illness,

those recovering seemed to have few sequelae. Recovery occurred in 62 cases and 14, or 22.5 per cent, of these showed some disability not present before onset. However, follow-up studies were carried on within less than 6 months after onset and is entirely too short an interval upon which to base conclusions. The most frequent complaint (noted in 6 cases) was weakness, with inability to do as vigorous work as formerly. Four individuals complained of neuritic pains in muscles of the arms and legs. Two complained of frequent and severe headaches. One, a child, had definite impairment of memory; another had signs of internal hydrocephalus. Two showed some muscular incoördination, ataxia and spastic paralysis of one arm, present a year after onset. So far, none has shown any tendency to develop Parkinsonism, although the period is as yet too short to which to draw a conclusion. Bredeck, *et al.*,⁷ in a follow-up study on the St. Louis outbreak, report that Parkinsonism was found to be quite uncommon as a residual.

Cases occurring during 1938 are being followed with a great deal of interest. As would be expected the cases are more widely distributed throughout the state, appear to be milder, and the fatality rate is correspondingly low.

CONCLUSIONS

1. This represents the first recognized outbreak of epidemic encephalitis due to the St. Louis type of virus in California.

2. In all, 102 cases were recognized from March, 1937, to February, 1938. There were 40 deaths.

3. Blood was obtained from 41, usually during the stage of convalescence. Twenty-one of these neutralized the St. Louis type of virus.

4. Geographically, the disease was limited to the rural areas of the San Joaquin Valley section of California, while the metropolitan areas were relatively free.

5. A definitely greater incidence of the disease in the younger age groups was noted

than occurred in the St. Louis outbreak of 1933.

6. Three to 6 months after recovery—22.5 per cent of the patients showed some disability which could be attributed directly to the disease. These ranged from headaches and weakness to spastic paralysis and mental changes.

NOTE: While this paper is based principally on cases occurring in 1937, it is felt advisable to mention briefly events during 1938. To date (October 15, 1938) 66 cases of epidemic encephalitis have come to our attention. The geographical distribution has been similar to that recorded last year.

In a number of these cases positive neutralization tests have been obtained with the St. Louis virus. However, some have been negative although the clinical picture was suggestive of the disease, as was noted also last year. Since this paper was written Miss Howitt⁸ reports the isolation of the virus of equine encephalomyelitis, Western type, in a fatal case from Fresno County. This case in a child, age 20 months, had a fulminating illness lasting 5 days, characterized by high fever, convulsions, spasticity, opisthotonus, and hyperactive reflexes. The spinal fluid count ranged from 12 cells per cm. to 44 cells per cm., with about 50 per cent lymphocytes. In Kern County, sera from 3 cases of encephalitis in children were found to neutralize the same virus.

Equine encephalomyelitis in horses has been present in California since 1930. In 1933 Meyer⁹ reported 3 cases in humans (1 fatal) which he felt were due to this virus. All had been in intimate contact with horses ill with the disease. Fothergill, *et al.*,¹⁰ recently reported the isolation of the virus of the

Eastern type of equine encephalomyelitis from a fatal case, in a child, age 7 years, who lived in an area in which the disease was present in horses.

Most of the cases reported in this paper resided in areas where equine encephalomyelitis in horses has been present. It is considered a possibility therefore that some of the cases which have been negative for the St. Louis virus, also some of those who neutralized the virus, may have been due to the equine strain. With that in mind sera are now being obtained from many of these persons for neutralization tests with the virus of equine encephalomyelitis.

REFERENCES

1. Hempelmann, Theodore E. The Symptoms and Diagnosis of Encephalitis. *J.A.M.A.*, 103:733-735 (Sept. 8), 1934.
2. Leake, J. P., Musson, E. K., and Choqe, H. D. Epidemiology of Epidemic Encephalitis, St. Louis Type. *J.A.M.A.*, 103:728-731 (Sept. 8), 1934.
3. Löwenberg, K., and Zbinden, T. St. Louis Type in Toledo, Ohio. *Arch. Neurol. & Psychiat.*, 36:1155-1165 (Dec.), 1936.
4. Report on the St. Louis Outbreak of Encephalitis. *Pub. Health Bull.* 214, 1935, pp. 40-49.
5. Howitt, B. F. Antiviral Substances to the Virus of Encephalitis (St. Louis Type) in Serum Collected in California. *Proc. Soc. Exper. Biol. & Med.*, 38:334-336, 1938.
6. Wooley, J. G., and Armstrong, Charles. The Distribution of Immunity Against Encephalitis Virus of the St. Louis Type in the United States as Determined by the Serum Protection Test in White Mice. *Pub. Health Rep.*, 49:1495-1505 (Dec. 14), 1934.
7. Bredeck, J. E., *et al.* Follow-up Studies of the 1933 St. Louis Epidemic of Encephalitis. *J.A.M.A.*, III:15-17 (July 2), 1938.
8. Howitt, B. F. Personal communication.
9. Meyer, K. F. Equine Encephalomyelitis. *North Am. Vet.*, 14:30-48 (June), 1936.
10. Fothergill, L. D., *et al.* Human Encephalitis Caused by the Virus of the Eastern Variety of Equine Encephalomyelitis. *New Eng. J. Med.*, Sept. 22, 1938.

Educational Qualifications of Health Officers*

A Report for the Consideration of the Governing Council at the 68th Annual Meeting, Pittsburgh, October 17-20, 1939

THE type of training most desirable for an individual seeking to become a health officer is well recognized. He should have had fundamental training in the sciences and the humanities at least equivalent to that required for a college degree in Arts or Science. He should have completed the course leading to the degree of Doctor of Medicine in a recognized medical school, and should have had at least 1 year of internship in an approved general hospital, including a communicable disease service. In addition to such internship the candidate should be given a preliminary period of supervised field experience in a well organized department of health for a period sufficient to give him acquaintance with the general aspects of public health and to give him also opportunity to determine something of his own liking for the work and his fitness for it. At the end of this preliminary field experience the candidate should receive at least 1 full academic year of graduate instruction in public health in a university. If possible, the candidate should have an additional year of practical experience in a subordinate position before be-

coming himself responsible for the conduct of the work of a department of health.

However desirable so complete a course may be, it is impracticable at this time to insist that all candidates for appointment comply with these requirements. In view of this practical situation, some modification may temporarily be made in the direction of recognizing the value of practical field experience obtained under competent supervision as in some measure substituting for formal education.

A few exceptional individuals not possessing a medical degree have achieved outstanding success as administrative health officers. It is reasonable, therefore, that the basic training represented by the medical degree, although advisable, should not be considered absolutely essential in the selection of health officers for jurisdictions where the duties of the health officer are mainly administrative, provided the candidate possesses an adequate general and biological education and has received not less than 2 academic years of graduate instruction in public health in a university.

RECOMMENDATIONS

1. That candidates for appointment as health officer should be graduates of approved medical schools who have completed successfully not less than 1 year of internship in an approved hospital and in addition a course of not less than 1 year of graduate instruction in

* The Committee on Professional Education of the American Public Health Association publishes this Report to permit the members and Fellows of the Association to review it and to offer criticisms and suggestions in the further consideration of the Report. Approved by the Committee on Professional Education April 25, 1939.

a university, leading to a degree in public health.*

2. That recognition be given to the fact that practical experience in public health administration is an essential part of the education of a health officer, and that great achievement can usually be attained only after long experience. These facts should always be taken into consideration in the selection of health officers, particularly where the position is one of great administrative responsibility.

The above recommendations are made for the future guidance of officials responsible for the appointment of health officers, and for the guidance of individuals looking forward to careers in public health. In making these recommendations the committee ex-

pressly recognizes the professional standing of persons now performing creditable service as health officers.

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* Where lack of qualified personnel makes it impossible to require a full year of graduate instruction in public health, the postgraduate requirements considered temporarily as applicable for medical health officers for small jurisdictions may be: the satisfactory completion of not less than 3 months of postgraduate instruction in public health in a university and not less than 3 months of supervised field experience in a well organized health department. Such individuals should be required to complete the course leading to a graduate degree in public health as soon as they have demonstrated ability sufficient to warrant such instruction.

Desirable Qualifications of Nurses Appointed to Public Health Nursing Positions in Industry*

*A Report for the Consideration of the Governing Council at the 68th
Annual Meeting, Pittsburgh, October 17-20, 1939*

THESE qualifications are suggested as aids to schools of nursing and those arranging public health nursing curricula, in planning future training programs, and as goals for nurses who wish to prepare themselves for service in this important field.

At present the number of nurses who, through education and experience, can meet all of these qualifications is limited. The qualifications, however, may serve as guides to employers in selecting nurses, and to encourage nurses already in service to secure further preparation.

Personal Qualifications:

The following personal qualifications are of the utmost importance for the nurse in industry:

An interest in and ability to work with all kinds of people; good physical health and emotional stability; initiative; good judgment; and resourcefulness. For the nurse working alone without nursing supervision, ability to organize her service also is necessary. The supervisor of other nurses must have qualities of leadership, executive and teaching ability, vision, and imagination.

(An idea of the nurse's personal qualifications may be obtained by personal interview and by reading her record from the nursing school and previous employer.)

Professional Qualifications:

I. For the nurse in an industry which provides supervision by a qualified nurse supervisor set forth under III below.

A. High school graduation or its educational equivalent is essential. More advanced education on a college level is desirable. Ability to use the typewriter and perform other clerical procedures is helpful to the nurse, especially in smaller industries where clerical assistance is limited.

B. Fundamental nursing education. The following are essential:

1. Graduation from an accredited school of nursing connected with a hospital having a daily average of 100 patients or a minimum of 50 patients with one or more affiliations affording supplementary preparation.

a. Instruction and experience in the care of men, women, and children, including patients with communicable disease.

b. Thorough instruction and

* The Committee on Professional Education of the American Health Association publishes this Report to permit the members and Fellows of the Association to review it and to offer criticisms and suggestions in the further consideration of the Report.

Approved by the N.O.P.H.N. January 25, 1939, and by the Committee on Professional Education of the A.P.H.A. April 25, 1939.

experience in surgical nursing, including operating room and first aid.

2. Instruction and experience are desirable in the following:

a. Outpatient department, especially in the emergency room.

b. Psychiatric nursing.

C. State registration.

II. For the nurse in an industry working without the guidance of a nursing supervisor.

This nurse must be able to plan the nursing program under the general direction of the medical officer, and should have a working knowledge of the principles of teaching, social case work, community organization and resources, public health administration, industrial relations, personnel administration, industrial hazards, nutrition, communicable disease, mental hygiene, and personal hygiene, as they affect the individual and his family.

A. All of the preparation listed above under I, and in addition:

1. At least one year of experience under qualified nursing supervision in a public health nursing service in which practice in the application of the above can be secured.

2. An academic year of study in public health nursing in one of the colleges or universities whose program is approved by the N.O.P.H.N.

a. Where courses in industrial hygiene and safety are available.

b. Where courses in principles

of public health nursing, mental hygiene, social work, preventive medicine, and allied subjects are made applicable to nursing in industry.

c. Where field work includes some experience in industry.

3. Supplementary experience and instruction in operating room and first aid nursing, if thorough preparation was not included in basic nursing education.

III. Supervisory positions

All the preparation under I and II, and in addition:

Successful experience in industrial nursing, part of which is preferably in the type of industrial work in which she is to act as supervisor.

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GUARDING THE HEALTH OF VISITORS TO THE GOLDEN GATE INTERNATIONAL EXPOSITION

SAN FRANCISCO is having an exposition this year just as New York is. San Francisco calls hers the Golden Gate International Exposition. The Department of Public Health has taken time by the forelock and in conjunction with the Water Department began a survey of the hotels on June 1, 1938, paying particular attention to the plumbing in order to insure a pure water supply to the tremendous number of guests who will undoubtedly visit the city. Especial attention was paid to cross-connections, which are always a danger, and have often allowed nonpotable water in other localities to reach the pure supply with disastrous consequences. The survey was completed by January 1, 1939. There were 651 hotels inspected and all hazardous conditions detected were corrected by January 15, or a month prior to the opening of the exposition on February 17.

In addition to the water supply, the condition of the sewers and the connections were also studied, as were also the fire system, water treatment equipment, and special house storage. Special attention was given to the water fixtures and connections in the kitchens and all departments devoted to the handling of food.

Except for very new hotels, blue prints of the piping are rarely available and those of the original building plans seldom resemble the layout actually found in old structures. Of the 651 hotels inspected, 82, or 12.6 per cent, were found to have one or more serious plumbing hazards, all of which, as pointed out, have been corrected. Advice and instruction were given to proprietors and they were also encouraged to look forward to remodeling and extension as opportunity offered, the gradual replacement plan being favored.

The method of routine bacteriological check of the general water supply of the city has been revised and improved and in addition to the tests of the general water supply, samples are examined once a week from all hotels which have dual supplies. It is felt that visitors can spend as much time in the city as they desire with a high degree of safety from diseases due to defective water supplies.

Treasure Island, the site of the Exposition, is under the Health Director

of the City and County of San Francisco. It is needless to add that every precaution has been taken to render the ground of the Exposition itself safe for visitors. All places supplying food or drink are under careful supervision which will be maintained throughout the time that the Exposition is open. The survey of the water supply, the correction of faults in plumbing, and the improvement in the bacteriological supervision of the water supply will be continued as a permanent benefit to the city under its efficient health system.

RESTORING LOST VITAMINS TO THE DIET

DESPITE the abundance and variety of American foodstuffs, the people of this country are, on the whole, not so well nourished as they should be. Most persons may consume food in sufficient *quantity*, but a surprisingly large proportion of the population apparently fails to select foods that give proper nutritive *quality*. Measured by the accepted standards of human nutrition, our national diet is defective, a fact that has a definite influence upon the state of the public health.

How do we know that the national diet is defective? By computing the actual national consumption of various foodstuffs, such as milk and dairy products, eggs, fruits, vegetables, bread and cereals, meats, and sugar, and comparing these figures with the amounts that would represent better all-round nutrition. Thus, we eat too much raw sugar and do not consume enough pasteurized milk, bread, eggs, fruits and green and yellow vegetables.

Recent investigations of approximately 4,000 food records among families in 43 cities have shown, furthermore, that fully half of these diets needed improvement.¹ Perhaps the most significant of the dietary faults discovered was a lack of sufficient calcium and vitamin A. Many of the diets were also inadequately provided with vitamin B₁ (thiamin), vitamin C (ascorbic acid), and iron. No data are given in this report on vitamin D, but many observations have indicated a paucity of this important food factor in the average family diet.

Assuming that these figures are fairly representative of conditions in the country as a whole, how can this situation be remedied? By improving economic conditions, and by the constant education of the public in the principles of sound nutrition. Public health education must include proper dietary information.

There is another way in which our national nutrition might be improved. If manufacturers and processors of various staple foods would develop methods to retain or restore the natural vitamins and minerals that are sometimes removed from these foods, their popularity and abundance in the diet would assure a greater intake of essential food factors.

Wheat and other grain products are outstanding examples. In the refining of flour, much of the original mineral and vitamin content is reduced. Some of these substances, but not all, are restored when white bread is made with milk solids, as is now the usual custom in the baking industry. White bread is our best and cheapest source of necessary food-energy, and there is no reason why it should not now be liberally used in a well balanced daily diet, but it would be even more valuable if it contained a larger quota of the vitamin B₁ (thiamin) and the iron of the unrefined wheat flour. The same can be said of milled white rice, another common cereal.

This problem of the restoration of lost vitamins to foods received considerable attention at the meeting of the American Institute of Nutrition in Toronto last

April. Various speakers advocated the fortification of our common foods with the vitamins and minerals in which they are often deficient.

Some progress has already been made in this direction. Fluid milk and evaporated milk have been fortified with vitamin D for a number of years, although these irradiated, metabolized, and concentrated vitamin D milks are used by only a relatively small proportion of the general public. Methods of milling white flour to retain vitamin B₁ have also been developed, and a yeast rich in this vitamin is now available for baking purposes, but these salutary methods have not yet been widely adopted. While vitamin A is now added to some of the margarines and other butter substitutes, this essential food factor might well be added to all of the fats that are lacking in it.

Optimal nutrition is one of the most important factors in good health. Modern food manufacturers have a glorious opportunity to contribute to national vitality by increasing the dietary values of their products.

REFERENCE

1. Stiebeling, H. K., and Phipard, E. F. Diets of Families of Employed Wage Earners and Clerical Workers in Cities. *Circ. No. 507*. U. S. Dept. of Agri. Jan., 1939.

PROLONGED PRESERVATION OF FOOD

WHEN we consider the important place which canned foods play in the life of civilized man today, and especially in the United States, it is rather surprising that more is not written concerning them. Scientific men and domestic science teachers know that the commercial canners have well equipped laboratories and employ the most expert scientific men and technicians. Also they take advantage of the services of many of the professors in our best universities; but in spite of all this the public generally and even professional persons, lack to an amazing degree a knowledge of the fundamentals of the great canning industry. Cases of poisoning, such as the deaths from botulism which occurred soon after the World War have attracted considerable attention. One still finds even among educated people superstitions concerning canned foods, the belief, for example, that as soon as air is admitted to a can the contents are liable to become dangerous and even poisonous. For example, in 1935, a national organization issued precautions against accidents in the home and advised the immediate removal of food from cans on opening. Again in 1936 a release by a national press service to newspapers throughout the country gave the impression at least that food left in open cans might become dangerous to health. Even authoritative bodies which should have known better have added to this erroneous idea.

In America there has recently become available an excellent book by A. W. Biting,¹ than whom there is no one more capable of informing us on this great subject. The section on the history of the art of canning was written by Mrs. Biting. The subject has been brought to the fore again in an excellent paper,² which has brought out valuable comment.³ This paper gives full credit to Nicholas Appert as having laid the foundation of the modern canning process in 1804. His book went through a number of editions in French as well as in English, and, in spite of the fact that in England Thomas Saddington was given an award by the Society of Arts, he admitted that his ideas were obtained while traveling abroad.

The article just referred to gives in some detail the process developed in England by John Hall of the Dartford Iron Works, and Bryan Donkin, a Fellow of the Royal Society, who substituted the use of iron containers for the glass jars first used by Appert. It must be remembered that Appert later used tin, a good quality of which at that time it was impossible to obtain since the French were poor artisans in working this metal, so that Appert made the cans in his own factory. Later he made his cans of wrought iron which he coated with tin after their manufacture. These contained from 4 to 45 pounds. The seams were brazed, and the cans were so strong that when emptied they were used as casseroles.

How long does a properly canned food remain good? As long as the can remains intact. We have been in the habit of quoting Letheby for the statement that in 1824 a ship with many tins of canned food was wrecked in Prince's Inlet. Eight years later Sir John Ross recovered some of these and although they had been exposed to alternate freezing and thawing they were in good condition. Sixteen years later another lot was found, and in 1868—44 years after the ship was wrecked—the remaining tins were opened by Letheby and found to be in perfect condition. In 1865, severe floods on the Genesee River in New York swept away a number of factories. Sixteen years later canned goods which had been buried in the mud since the flood were recovered and found to be in good condition.

The most recent evidence has been furnished by Professor Drummond and his co-authors. Two canisters of food prepared by the Donkin process, one a 4 pound can of roast veal, from the stores of H. M. S. *Hecla* on Parry's voyages to the Arctic in 1824 and again in 1826, had been put in the museum of the Royal United Services Institution. The second was a 2 pound tin of "carrots and gravy," which had been on the third Arctic voyage in 1824. In opening the cans great precautions were taken to collect the gas. When the can containing veal was opened the gas rushed out under high pressure, certainly more than 15 pounds to the square inch. Chemically this was found to be mostly hydrogen due to the action of the acid soup on the tin lining. The meat was in excellent condition, the odor most appetizing, and though the fat had been largely hydrolized, no trace of rancidity was present. The taste was good, though insipid, and for 10 days maintained the health and normal growth of young rats. Both flavin and vitamin D were found, but vitamin B was absent. Bacteriological examination showed three different types of aerobic spore-bearing bacilli, all of which grew at 55° C. There is no question that these organisms had retained their life in the spore form for more than 100 years, and were probably derived from the flour used to thicken the soup. The can of carrots and gravy was bacteriologically sterile, but showed a high pressure of gas, which also consisted mainly of hydrogen. There was not enough to carry out animal feeding tests for ascorbic acid, but carotene was found in a concentration little below that of fresh carrots. The metal containers were examined in the International Institute for Tin Research, then returned to their owners, where they remain as an exhibit at the Royal United Services Institution in Whitehall.

REFERENCES

1. Bitting, A. W. *Appertizing or the Art of Canning*. The Trade Pressroom. San Francisco. 1937.
2. Drummond, J. C., Lewis, W. R., Macara, T., Wilson, G. S., and Shipp, H. L. *Chemistry and Industry*. 57:898, 827 and 914, 1938.
3. *Brit. M. J.*, Mar. 11, 1939, p. 514.

BOOKS AND REPORTS

The Anaerobic Bacteria and Their Activities in Nature and Disease: A Subject Bibliography—By *Elizabeth McCoy and L. S. McClung*. Berkeley: *University of California Press*, 1939. Vol. I, 295 pp., Vol. II, 602 pp. Price, \$10.00.

This is a monumental work which does not lend itself to the ordinary review. The authors state in the preface that it is the result of approximately 5 years of research, covering some 10,500 original articles in journals, monographs, or other published reports, with 120,000 entries. With a few exceptions, which are noted, each of these articles has been examined in the original and placed in the appropriate subject section. Even after this gigantic task, the authors do not claim that the index is "complete," as certain publications were not available to them.

Volume I is a Chronological Author Index and contains 295 pages. Volume II is a Subject Index and contains 602 pages. As an example of the arrangement, the Subject Index outline is divided into 9 heads, under each of which are subheads, running as high as 15 in some instances. In addition to the general subject matter there are special lists giving Bulletins of Institutes, Governments, etc., which report new data, Monographs, Obituaries, Patents, and Theses.

In the list of Species of Anaerobic Bacteria, there are some 425 spore bearing forms and 246 non-spore-bearing forms given. There are 98 named types of strains and 14 unnamed.

We commenced the notice of this book by calling it a monumental task, and so it is. It would be a bold re-

viewer who undertook to criticise without giving at least a year of study to it. We can only say here that it has every appearance of being a most carefully prepared piece of work and of being entirely authentic, of which the names of the authors would assure us. We cannot but admire the authors for their conception of the plan and their industry in carrying it out. Even putting it through the press must have been an enormous task.

We can understand the feeling of the authors when, in the last paragraph on page iv, they quote Dr. Heller: "The anaerobist working on bibliography is surely a creature to be pitied, and is not to be blamed for failing to follow the work of others conscientiously and thoroughly." MAZÛCK P. RAVENEL

Reorganization of the National Government: What Does It Involve?—By *Lewis Meriam and Lawrence F. Schmeckebier*. Washington: *The Brookings Institution*, 1939. 272 pp. Price, \$2.00.

While there is virtually nothing about public health in this book, persons who are interested in the possible coördination of some or all of the widely scattered health activities of our national government, and in the general promotion of efficiency and economy in the operations of the federal bureaucracy, will find much of interest and value in this book. The first part, by Mr. Miriam, discusses the philosophy behind the federal reorganization movement, and presents a lucid explanation of all the factors involved in it: while the second part by Mr. Schmeckebier describes the various attempts in the

past to do something about our unwieldy governmental machine. Both authors have devoted many years to research on the federal government and are experts in this field.

JAMES A. TOBEY

Civilization Against Cancer—By Clarence Cook Little, Sc.D. New York: Farrar & Rinehart, 1939. 150 pp. Price, \$1.50.

In furtherance of the laudable attempt to "fight cancer with knowledge," the managing director of the American Society for the Control of Cancer has prepared this compendium for the general reader. In 12 concise chapters he gives the rules for recognizing malignant growths, describes the history and present organization of the educational activities against cancer, outlines the progress of scientific research on the subject, and discusses various other pertinent aspects of this significant public health problem. Sanitarians will be particularly interested in the exposition of modern cancer research, a field in which the author has distinguished himself. Members of the Women's Field Army against Cancer will find that the book is an excellent guide for their worthy efforts, while other members of the lay public who have the courage to delve into the subject will derive much useful information and possibly some inspiration from this well printed book. JAMES A. TOBEY

The Municipal Year Book, 1939—Chicago: International City Managers' Association (1313 East 60 Street), 1939. 586 pp. Price, \$5.00.

This sixth issue of the *Municipal Year Book* devotes much more space to individual statistics of cities than previous issues. For the first time the *Year Book* presents an entirely new statistical section covering police, fire, utility, welfare, health, library, and recreation activities.

The *Year Book* is divided into six general divisions: résumé of municipal activities in each of 24 fields in 1938, general governmental data, municipal personnel, municipal finance, municipal activities, and sources of information. For each of the 1,809 municipalities in the United States over 5,000 population, the *Year Book* gives a great deal of information such as number, salary, term, and election date for city council, titles of officials elected by the people, utilities owned, etc. Another section of the book gives for each of 834 cities the number of employees, total salaries and wages, whether a city has a classification and pay plan for employees, and a list of cities in which municipal employees are unionized and to what unions they belong. For each of the 960 cities over 10,000 the *Year Book* lists the names of 12 chief municipal officials.

Two features which greatly increase the utility of this issue are an index to the contents of previous issues and a thumb index which gives immediate access to statistical tables. W. R. W.

Manual of Veterinary Bacteriology—By Raymond A. Kelser, D.V.M. (3rd ed.) Baltimore: Williams & Wilkins, 1938. 640 pp. Price, \$6.00.

The first edition of this book was published in June, 1927, the second in June, 1933. Since there are few textbooks on bacteriology written from this point of view, the former editions were received with much interest and appreciation by the veterinary profession and the medical profession as well, because of the intertransmissibility of many animal and human diseases.

In this third edition the author has improved the *Manual* very much by the inclusion of new material, and 88 pages have been added. The number of chapters has not been increased, but the old ones have been revised and brought up to date. The chapter on

Bacteriological Examination of Milk and Water is noticeable in this respect. This revision maintains the same high plane which characterized the former editions. It is a valuable addition to literature for veterinary students and those specializing in veterinary bacteriology.

The printing, make-up and illustrations are good. A. J. DURANT

Big Fleas Have Little Fleas, or Who's Who Among the Protozoa—By Robert Hegner. Baltimore: Williams & Wilkins, 1938. 285 pp. Price, \$3.00.

BIG FLEAS Have LITTLE FLEAS
Upon Their Backs to bite 'em
And LITTLE FLEAS Have LESSER FLEAS,
And so, AD INfinitum.

We wonder whether this presages a new type of textbook, a sort of intellectual painless dentistry, as it were! While the versicle which serves as the text for the author has been known for many years, no one has ventured to write a book in the same vein on such an abstruse subject as protozoölogy. The illustrations are plentiful and good. Alongside of correct representations in black and white, many beautifully done, we have caricatures which will not only fix the appearance of the organism, if not its name—*Acanthocheilonema* for example—in the mind, but will also impress upon the reader the many different types of these early forms of life and perhaps more so their various activities and modes of living, often at the expense of a human host. Most of these are extremely clever.

The author is one of the outstanding protozoölogists in this country and no one is better qualified than he to tell us about the protozoa. The scientific material is sound and most interestingly told. Interspersed throughout the text are a number of poems which prove that the author is as familiar with his

hymn book as with Pinafore. These are extremely amusing and all tell their story.

There are very interesting accounts of the author's trips into the jungles of the Philippines, where they hunted calingas and crocodiles for the sake of their protozoölogical contents, and in Tropical America where they hunted monkeys for the same purpose. These trips led to the production of a poem, the first two verses of which read:

In Filipino's tropic clime
Where everything entrances,
The monkey and the tarsier
Free wheel among the branches

In Panamanian wilds as well
The spider and the owl
Are monkeys full of parasites,
Ye Gods, just hear them howl.

The author points out things which we have to guard against in the future. For example, the International Highway is in the way of approaching completion and already we are in close touch with many tropical countries, so that motorists who stay there even a comparatively short time will be just about ready to exhibit symptoms of their catch when they reach home. Endemic areas will be established in certain localities in this country where intermediate hosts are indigenous. Even now the protozoölogist does not have to travel far to find an abundance of material, and apparently there will soon be a super-abundance. The author says plaintively:

"How did the protos become so prominent?
Mass reproduction rendered them dominant.
Why do the protozoölogists weep?
The're too many protos and too little sleep."

The book grew out of the Messenger Lectures, given before a general audience at Cornell University in 1937. There are three appendices, one General Remarks about Protozoa, one a Glossary—much needed by the average reader—and one Bibliography. A good index ends the scene.

The printing and make-up are excellent and the book can be recommended both for the information it contains and the delightful style in which it is written. Before this time one could hardly have imagined that such a difficult subject could be made so entertaining.

MAZÏCK P. RAVENEL

Virus Diseases and Viruses—

By Sir Patrick P. Laidlaw. New York: Macmillan, 1939. 51 pp. Price, \$.90.

This is an attractive and thoroughly satisfactory review of information concerning the filterable viruses. Conspicuously noteworthy is the discussion of the nature of these disease producing agents. While the various opinions currently expressed can scarcely be considered as having reached the stage of controversy they do remind one of the time when Bastian was opposing Tyndall, in England; especially do they recall the conciliatory remark of a British clergyman who, in seeking to pour oil on the troubled waters, said "It is now generally agreed that there is no such thing as spontaneous generation—excepting possibly with regard to the infinitely small." We have come dangerously near the conclusion that this statement should be made all over again. Therefore the section of this lecture which deals with the author's own theory is particularly timely.

So thoroughly interesting and so basically sound is this lecture that everyone concerned with disease should take the opportunity to read it carefully.

A. P. HITCHENS

The New Baby—By Evelyn S. Bell and Elizabeth Faragoh. Philadelphia: Lippincott, 1938. 64 pp. Price, \$1.00.

Photography with the help of simple captions tells the story of the arrival of the new baby and its place in the family. The book is designed to appeal to children who sooner or later raise

questions as to the origin of the new baby. The pictures are exceedingly well posed, in fact they appear as "candid shots," and occupy full pages opposite appropriate statements which carry the story from page to page. The book should prove valuable to parents and teachers as a medium to place in the hands of preschool children.

RICHARD A. BOLT

The Detroit Industrial Worker and His Health—Detroit, Mich.: Detroit Department of Health, Bureau of Industrial Hygiene, January, 1939. 30 pp.

Detroit's Health Department in this "photo off-set" brochure of 30 unnumbered pages makes a bid for community interest in industrial hygiene. A credo of 8 facets defines the wants of the industrial worker with respect to his health. In flowing style, easy for the "man on the street" to read and understand, the necessities for adequate industrial hygienic measures for the workers of Detroit are simply portrayed. The text is not unlike present-day popular magazine writing in the field of the medical sciences.

Outstanding difficulties and hazards confronting the workingman are described. Not too greatly burdened with statistics, with here and there an interesting line drawing and spot map, this publication presents a record of accomplishment and indicates the needs for the extension of future industrial hygiene activities in Detroit.

The introduction is an allegory in prospecting for "industrial health gold" in this manufacturing city. Short chapters on Detroit's factories and work places, Detroit's industrial workers, and high points in the bureau's activities for the year 1938 tell the general story. A chapter is devoted to silicosis, and a section under the title "One Achievement" relates the accomplishments of the automobile industry in

controlling lead poisoning. Basic terms in industrial health are defined, and, finally, the industrial health needs for Detroit's workers are outlined.

The report states "Detroit, already known to the world as a great industrial city, needs to be known as a city where the health of its industrial workers is adequately protected." This brochure is an excellent presentation and interpretation of the Bureau's work and plans.

BERNARD S. COLEMAN

Our Common Ailment: Constipation, Its Cause and Cure—*By Harold Aaron, M.D. New York: Dodge Publishing Co., 1939. 192 pp. Price, \$1.50.*

This is a very readable little book and contains a great deal of information on an ailment that some people may suffer from and a great many more think they suffer from. It is intended for the two classes just mentioned but can be profitably read by those who have no such ailment. It is written in non-technical language for the lay reader, but the information presented is based on the newer and scientifically tested knowledge of today. It deals with some of the worn out notions about the processes of digestion and the excretion of waste products. The author classifies and treats of constipation under three types; colonic, rectal, and spastic.

It tells about the false ideas great numbers of people have about the benefits of laxatives, colonic irrigations, and alkalinizations. It suggests the tremendous waste of money spent for these purposes and teaches that only in special cases should these measures be resorted to and only when recommended by a physician.

It classifies the many cathartics and laxatives in common use and points out that even when the use of such is indicated, some very cheap preparation

may be just as effective as the high priced article bearing a catchy name.

JAMES WALLACE

Medical Entomology, With special reference to the health and well-being of man and animals—*By William B. Herms. (3rd ed.) New York: Macmillan, 1939. 582 pp. Price, \$5.00.*

Though under a somewhat different title, this is the third edition of *Medical and Veterinary Entomology*, published first in November, 1915. This edition has been completely revised and reset and in almost every way has been brought up to date. Emphasis is placed on the rôle of insects and arachnids in public health and human welfare. All of the major groups of the arthropod vectors of disease are considered with their life history and recommendations made for their control. There is sufficient discussion on general parasitology and insect morphology to enable the reader to understand the part which arthropods play in the transmission of disease.

The last chapter in the book discusses the utilization of arthropods in medical practice. We find mention of some ideas which have been discarded, such as the use of cockroaches, crickets, and grasshoppers, one variety of which is said to have been a very good antidote against the poison of the scorpion. Of late years, owing largely to the influence of Baer, of Johns Hopkins, the employment of maggots in the treatment of wounds and indolent ulcers has gained a certain amount of popularity and the author gives directions for producing sterile maggots. Of greatest practical interest, however, is the use of the malarial parasite in general paresis, introduced in 1917 by Wagner-Jauregg. We could wish that this whole chapter were somewhat longer and went into more detail concerning the special laboratories in which mosquitoes are reared and in-

fected, then shipped considerable distances.

The author does not mention the fact that the *Anopheles gambiae* has reached the shores of South America, brought over probably from West Africa by an airplane or fast French destroyer. This is one of the most dangerous of all the malaria-bearing mosquitoes, and its presence in South America, especially in these days of the airplane, menaces the United States. It was recognized on this side of the Atlantic in 1930, and by 1931 had traveled up the coast from Natal 115 miles. In 1938 it was the cause of more than 50,000 cases of malaria in the Jaguaribe Valley. In the affected areas it is estimated that in 1939 nearly every person will be on government relief as a result of its ravages.

A few inaccuracies have been observed. Proper credit is given to Josiah Clark Nott as having been the first (in 1848) to advance a well formulated idea concerning the carriage of both malaria and yellow fever by mosquitoes, but he is credited to New Orleans. He was a native of Columbia, South Carolina, and a resident of Mobile, Alabama.

The printing and make-up are excellent. The illustrations are good, many of them especially so. It is dedicated to the late Dr. G. H. F. Nuttall, a native of California and the frontispiece is an excellent likeness of him. The book is a valuable reference text for practising physicians as well as teachers and students of medical entomology, and should be found in every medical library.

LEONARD D. HASEMAN

Veterinary Helminthology and Entomology—By H. O. Mönnig (2nd ed). Baltimore: Wood, 1938. 409 pp. Price, \$9.00.

The second edition, after 4 years, of this attractive textbook and reference work will be welcomed by persons con-

cerned with the health of man and of animals. The diction is clear and attractive in style. All sections are thoroughly systematized and there is a fine index. The bibliography is sufficiently extensive to indicate the main sources of information.

The first section deals with the general matters of parasitism, pathogenesis, pathogenic effects, resistance and immunity, general distribution and history; the second covers technic; this includes the collection and preservation of helminths and of arthropod parasites and the making of permanent preparations. There is a very practical section on clinical diagnostic methods in which the technical procedures in most common use are so described that they can be readily followed by laboratory technicians. There are short sections on blood examination for larvae and the technic for eliciting and studying allergic reactions. The section on helminth parasites gives adequate descriptions of the various parasitic worms; their arrangement and characterization are in accordance with the rules of the International Commission on Zoölogical Nomenclature.

The arthropod parasites are discussed after the same manner as are the helminths.

A useful appendix lists the parasites mentioned which infest man, equines, sheep, cows, cattle, pigs, dogs, cats, various wild animals, rodents, and birds.

The book is well printed on excellent paper and attractively bound. It can be thoroughly recommended as a working manual. A. P. HITCHENS

Proceedings, Occupational Disease Symposium—Chicago: Northwestern University Medical School, Department of Industrial Medicine, 1939. Paper covers, typewriter planograph, 99 pp. Price, \$3.00.

The report of this second annual

symposium, held September 26 and 27, 1938, comprises 8 papers followed by extensive discussions. In addition there are included 2 papers given at the Annual Dinner of the Department of Industrial Medicine, held November 15, 1938.

This second symposium contrasts with the first one held the year previous which was devoted chiefly to specific diseases among workers.

There is such a wealth of material embodied in the present symposium-report as to constitute a veritable textbook in itself. Unfortunately space does not permit even a brief synopsis. All of the authors and discussants are outstanding authorities in their various fields.

One feature, omitted from various conferences in this field, is upon formal industrial medical education, presented in detail by Dr. Peterson. He bases his paper chiefly upon inquiries made of medical and postgraduate schools and special societies, and shows serious oversight in this direction. Dr. Seeger of Milwaukee also stresses this as well as others of the discussants.

The reviewer feels that this symposium, like most of those in this field in recent years, fails to include the labor viewpoint as might be presented, for instance, by a physician actively connected with one of the labor unions, some of which are seriously promoting educational, recreational, clinical, and health projects. No doubt also a report from an officer of a sick benefit association would be interesting. There is also the point of view of the small business man and of the small plant, likewise that of the family practitioner in the mining, industrial, or agricultural labor area. The background effect of the economic status of workers upon their industrial health might be presented by a welfare or social case worker. Finally there is the desirability of a report by an intelligent but

impoverished worker who is confronted with the cost of family health maintenance and medical care in the face of a low average annual wage, such as \$975 as recently reported by the Social Security Board for the fairly good year of 1937, for over 30 million workers. The question is, Who really represents the worker in our numerous industrial health conferences, as valuable as they are as educational and inspirational forums?

The monograph contains several valuable tables, charts, summaries, and bibliographies, while the work has been carefully edited and the large type makes easy reading. An index would considerably enhance its utility.

EMERY R. HAYHURST

The School Health Program—
By C.-E. A. Winslow. New York: McGraw-Hill, 1938. 120 pp. Price, \$1.50.

An Inquiry into the character and cost of public education in the State of New York was undertaken late in 1935 in order to find out what the educational system of the state is accomplishing, how well its total program fits present-day needs, and what the costs of that program are and should be, with the purpose of reformulating the fundamental educational policies of the state. The Inquiry was divided into 3 major undertakings: (1) the examination of the educational enterprise in the state and the analysis of its outcomes, methods, and costs; (2) the critical appraisal of the work now under way; and (3) the formulation of policies and programs for dealing with the immediate problems and issues, and the long-range objectives of the educational system of the state. The purpose of the inquiry

... has not been to gather great masses of statistics, to devise numerous questionnaires, or to present meticulous factual descriptions of

every phase of education within the state. Rather, the Regents' Committee and the staff of the Inquiry have been interested in isolating major issues and in hammering away at the problems which presented themselves in order to find a reasonably comprehensive solution which would commend itself to the forward-minded people of the State of New York.

Among the studies separately published is a review of the health program of the schools by Professor C.-E. A. Winslow, assisted by Charles C. Wilson, M.D., Director of Physical Education, Hartford, Conn., and Martha W. MacDonald, M.D., of the Michael Reese Hospital, Chicago, Ill. Among those participating in the Inquiry were Don W. Gudakunst, M.D., of Michigan; Clara Bassett, Consultant in Psychiatric Social Work of the National Committee for Mental Hygiene, and Anne Whitney, Director of the School Health Education Service, Washington, D. C. The entire Inquiry was under the direction of Professor Luther Gulick of New York.

This report breaks down the school health program into sanitation in the schools, mental hygiene, health instruction, physical education and recreation, and health services. The report contains an excellent statement of the objectives of the health program broadly conceived, placing emphasis not only on a healthful physical environment but on a healthful intellectual and emotional environment interfused with sound and vital health instruction, a well planned program of physical education and recreation, and a health service program which includes a comprehensive health examination three times during the child's school life.

It is proposed that the health examination of the school child should be made wherever possible by the family physician and that it should be regarded as an educational procedure. The report recommends that the correction of defects should be primarily

a family responsibility, and that the chief function of the school nurse should be to arouse the sense of such responsibility. Where public clinic service is necessary it should preferably be provided by the health department or other community agencies rather than through the educational system. The board of education must, however, recognize the responsibility of providing necessary treatment where serious efforts to obtain it in other ways prove unavailing. The various elements of the school hygiene program should not be regarded as separate entities. They can be truly effective only when so integrated in a coordinated whole as to contribute to the sum of all experiences which favorably influence habits, attitudes, and knowledge relating to individual, community and racial health. For this reason the committee believes that all phases of the program should be under the jurisdiction of the educational authority, although medical and nursing personnel of the health department may often be used as the agent of the board of education in this field with great advantage.

The committee recommends the organization of a bureau of health education in the division of the State Education Department which controls the curriculum. This bureau, under the direction of a chief who is qualified as an experienced school administrator, should include representatives of health instruction, physical education, medicine, nursing, and dentistry. There should be added as well the specialists for the care of the physically handicapped. Two new fields should also be represented, namely, public health engineering and mental hygiene. An engineer to advise with regard to the health aspects of school construction and to carry on an educational campaign in the health aspects of school operation is regarded as essential. Similarly the appointment of a mental

hygienist is essential for the formulation and execution of any sound mental health program. This should be formulated in terms of the infusion of a mental hygiene point of view into the objectives and methods of education, rather than in terms of detecting cases of individual maladjustment. Mental hygiene is described as the essence of any true educational process. The report advises against the continuation in the bureau of health education of specialists in diseases of the eye and ear, and of the heart and lungs, partly because there are no corresponding experts in the local school systems for such

specialists to supervise and partly because their employment tends to stress an emphasis on curative problems which lie outside the field of education proper. It is recommended that the entire school health program should be formulated and conducted under the advice of a regularly constituted and continuing council on health education.

This report is both critical and illuminating. It will be of value not only in New York State but in other states where the experience of New York State as analyzed by so able a group of students can prove fruitful.

REGINALD M. ATWATER

BOOKS RECEIVED

- FIGHTING FOR LIFE. By S. Josephine Baker. New York: Macmillan, 1939. 264 pp. Price, \$2.75.
- SWIMMING POOL STANDARDS. By Frederick W. Luehring. New York: Barnes & Noble, 1939. 273 pp. Price, \$5.00.
- WHEN SOCIAL WORK WAS YOUNG. By Edward T. Devine. New York: Macmillan, 1939. 163 pp. Price, \$1.75.
- NURSING THROUGH THE YEARS. By Corinne Johnson Kern. New York: Dutton, 1939. 340 pp. Price, \$2.50.
- THE PATIENT AS A PERSON. By G. Canby Robinson. New York: Commonwealth, 1939. 423 pp. Price, \$3.00.
- EDUCATING FOR HEALTH. By Frank Ernest Hill. New York: American Association for Adult Education, 1939. 224 pp. Price, \$1.25.
- BERGEY'S MANUAL OF DETERMINATIVE BACTERIOLOGY. By David H. Bergey, Robert S. Breed, E. G. D. Murray and A. Parker Hitchens. Baltimore: Williams & Wilkins, 1939. 1032 pp. Price, \$10.00.
- ROBERT KOCH. SA VIE ET SON ŒUVRE. By Docteur Emile LaGrange. Paris: M. Legrand, 1939. 90 pp.
- HEALTH OFFICERS' MANUAL. By J. G. GEIGER. Philadelphia: Saunders, 1939. 148 pp. Price, \$1.50.
- THE HEALTH OF COLLEGE STUDENTS. By Harold S. Diehl and Charles E. Shepard. Washington: American Council on Education, 1939. 169 pp. Price, \$1.50.
- MEDICAL MICROBIOLOGY. By Kenneth L. Burdon. New York: Macmillan, 1939. 763 pp. Price, \$4.50.
- HISTORICAL DIRECTORY OF STATE HEALTH DEPARTMENTS IN THE UNITED STATES OF AMERICA. By Robert G. Paterson. Columbus: Ohio Public Health Association, 1939. 68 pp. Price, \$1.00.
- A SYNOPSIS OF HYGIENE. By Sir W. Wilson Jameson and G. S. Parkinson. 6th ed. London: J. & A. Churchill, 1939. 687 pp. Price, \$6.25.
- MATRIMONIAL SHOALS. By Royal D. Rood. Detroit: Detroit Law Book Co., 1939. 424 pp. Price, \$3.50.
- HEALTH FOR 7,500,000 PEOPLE. Annual Report of the Department of Health, City of New York, for 1937 and a Review of Developments from 1934 to 1938. By John L. Rice. New York: Department of Health, 1939. 390 pp.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Interesting Statistic—Mr. Weller's excellent advice to his son Samuel to "be vware of vidders" finds statistical justification in this analysis. Well seasoned widows and divorcees for some reason, not stated, are able to catch men younger than can spinsters.

ANON. Age at Marriage and Remarriage. Stat. Bull. (Metropolitan Life Ins. Co.), 20, 4:4 (Apr.), 1939.

Proof That Prevention Pays—New England cities report downward trend in diphtheria deaths, the Middle Atlantic cities hold first place again, and throughout the rest of the country progress is reported in varying degrees except in the Pacific and Mountain states. Results suggest again that rates decline where health agencies urge prophylaxis.

ANON. Diphtheria Mortality in Large Cities of the United States in 1938. J.A.M.A. 112, 20:2043 (May 20), 1939.

Reassuring Vital Records—In 1938 deaths from typhoid and scarlet fever, diphtheria, polio, meningitis, tuberculosis, malaria, pellagra, nephritis, and diseases of pregnancy and childbirth were the lowest on record. Mortality rates from influenza and pneumonia were down too. Cancer and heart disease were the only major causes of death that were higher. Measles case incidence was up. Infant mortality reached a new low of 48, despite the increased birth rate which was up for the second consecutive year.

ANON. Trend of Morbidity and Mortality During 1938 and Recent Preceding Years. Pub. Health Rep. 54, 18:725 (May), 1939.

Typhoid Fever Deaths Reduced—In the large cities of the United

States, the trend of the typhoid fever mortality rate is still downward. Noteworthy gains were made in the North Central group of states and New England, and the Middle Atlantic states continue their excellent record of long standing.

ANON. Typhoid Fever in the Large Cities of the United States in 1938. J.A.M.A. 112, 19:1941 (May 13), 1939.

High Case Fatality Ratios—Two stimulating papers discussing the question of improved mortality experience among the tuberculous as an influence upon the general decline in tuberculosis mortality rates. One presents evidence that modern tuberculosis treatment does cure a large enough proportion of cases to have measurable effect upon rates; the other regretfully doubts the validity of the presented evidence.

BOGEN, E. Life Expectancy in Tuberculosis (and) DROLET, G. J. Case Fatality Rates in Tuberculosis. Am. Rev. Tuberc. 39, 5:587 (May), 1939.

Permanent Diphtheria Immunity—Quantitative Schick tests were done upon children earlier immunized with 3 doses of toxin-antitoxin, 2 doses of plain toxoid, 1 dose of alum-precipitated toxoid, or 3 doses of plain toxoid. The results suggest that more immunity is conferred when the antigen is given in greater number of doses at longer intervals. Three doses of toxoid at monthly intervals seem to give the best results.

BUNDESEN, H. N., *et al.* Diphtheria Immunity in Chicago. J.A.M.A. 112, 19:1919 (May 13), 1939.

Something New for Premies—A description of a sealed air-chamber incubator for premature infants which

removes most of the hazards of immediate contact and prevents air-borne infection while providing optimum atmospheric environment. Morbidity and mortality rates have been substantially lowered by its use.

CHAPPLE, C. C., and KENNEY, A. S. Limitation of Bacterial Contamination of Air by a New Automatic Incubator for Infants. *Am. J. Dis. Child.* 57, 5:1058 (May), 1939.

Who Gets Dental Care?—As you would expect, members of families in the \$5,000 plus income level have five times the dental services that those in the \$1,200 minus level enjoy. But this is only one of many important findings you will discover in this survey of the habits of a great many white families.

COLLINS, S. D. Frequency of Dental Services among 9,000 Families, Based on Nation-wide Periodic Canvasses 1928-1931. *Pub. Health Rep.* 54, 16:629 (Apr. 21), 1939.

Consoling Idea Scotched—Wishful thinking that cancer of exposed areas tends to curtail cancer of the more inaccessible parts finds no confirmation in this analysis of British mortality records. In general, occupations in which there is a relatively high skin and lip cancer rate also show an excess of cancer of other sites.

CONRAD, K. K., and HILL, A. B. Mortality from Cancer of the Skin in Relation to Mortality from Cancer of Other Sites. *Am. J. Cancer.* 36, 1:83 (May), 1939.

Maternal Care Does Benefit—Improvement in maternal mortality rates applies about equally to urban and rural residents. Although the environment may be better in rural areas, and complications of pregnancy more frequent among city dwellers, the more general availability of prenatal and postnatal care in larger communities compensates for the other factors.

DORN, H. F. Maternal Mortality in Rural and Urban Areas. *Pub. Health Rep.* 54, 17:684 (Apr. 28), 1939.

Unto the Least of These—Two million children are born each year, and 35 million more are still in the process of growing up. Here, indeed, is a social medical problem which is inevitably permanent. We have been slow to accept public responsibility in this regard, but we are showing signs of improvement.

ELIOT, M. M. Public Responsibility for Safeguarding the Health of Children. *Am. J. Dis. Child.* 57, 4:916 (Apr.), 1939.

Whooping Cough Prophylaxis—In a series of 4,212 children, 1,815 were immunized with pertussis vaccine and all were watched for 44 months: during this time 52 treated children contracted the disease and 348 of the controls also succumbed. Among the known exposed children the infection rate among the immunized was 12.8 per 100, compared with 68.5 in the controls. The attacks were less severe among the immunized children.

KENDRICK, P., *et al.* A Study in Active Immunization Against Pertussis. *Am. J. Hyg.* 29, 1:133 (May), 1939.

Eloquent Plea for Better Geriatrics—What we do not know about the mental habits, the emotions, and the capabilities of old people is convincingly set forth in this able review which concludes that there is no group of persons whose mental welfare is more neglected than the aged.

LAWTON, G. Mental Hygiene at Senescence. *Ment. Hyg.* 23, 2:257 (Apr.), 1939.

Colds, Effort, and Exposure—Whatever the causal agent of the common cold may be, it seems capable of precipitating onset most readily when it is present at a time when the normal defenses have been made vulnerable by fatigue-enforced increase in susceptibility to shock. For evidence, see paper.

LOCKE, A. Non-Specific Factors in Resistance. *J. Immunol.* 36, 5:365 (May), 1939.

Unsuspected Causes of Illness— Subclinical states of nutritive failure are of utmost importance to the hygienist because they are numerous and baffling, and because they impair the patient's sense of well-being. A number of such conditions are described and what was done about them is told.

McLESTER, J. S. Borderline States of Nutritive Failure. *J.A.M.A.* 112, 21:2110 (May 27), 1939.

Weather Controversy Continued—Prevailing average temperatures and man's combustion rates are related, this author maintains—despite the expressed doubts of others. That the northern half of the Mississippi enjoys more metabolic breakdowns than the southern part is a case in point. Diabetes, goiter, Addison's disease, as well as disturbances of the circulatory function are affected by this phenomenon.

MILLS, C. A. Climate Metabolic Stress. *Am. J. Hyg.* 29, 3:147 (May), 1939.

Why They Take Pen in Hand— Ten thousand requests for information addressed to the Public Health Service from every corner of the United States are surveyed. One hopeful sign is a shift from disease entities to hygiene, sanitation, and provisions for medical care in the questions asked. Also noteworthy is interest taken in chronic conditions rather than acute communicable diseases, which formerly received the lion's share of attention. Everyone will find this analysis most provocative.

OLESEN, R. What People Ask About Health. *Pub. Health Rep.* 54, 19:765 (May 12), 1939.

Tuberculosis Prophylaxis—This study indicates that vaccination with heat-killed tubercle bacilli confers some protection to the disease. The place was a Jamaica mental hospital where exposure is likely. About half of those admitted with negative skin tests were given 5 injections of vaccine. The

rest were controls. The attack rate was appreciably lower in the treated group.

OPIE, E. L., *et al.* Protective Inoculation against Human Tuberculosis with Heat-Killed Tubercle Bacilli. *Am. J. Hyg.* 29, 3:155 (May), 1939.

Civilized Tooth Decay—Dental caries is distinctly more prevalent among Eskimos who have picked up white man's habits than among primitive groups who have never enjoyed such blessings. The caries which does occur among the Eskimos is the common or garden variety.

ROSEBURY, T., and WAUGH, L. M. Dental Caries among Eskimos of the Kuskokwim Area of Alaska. *Am. J. Dis. Child.* 57, 4:871 (Apr.), 1939.

Certain Conclusions from Uncertain Data—Evidence in vital statistics is not of a quality to warrant a definite statement that heart-disease or cancer is, or is not, increasing as a public health problem. Discrepancies between recorded rates and reality vary widely in both degree and direction. Proof is given.

ROSS, M. A., and MCKINNON, N. E. Heart Disease and Cancer Trends. *Canad. Pub. Health J.* 30, 4:171 (Apr.), 1939.

About Leading the Horse to Water—Four years after being given contraceptive advice at a Cincinnati clinic, the recipients were interviewed. Four out of 5 seemed to be doing quite well, but more than half had rejected the advice they had received.

STIX, R. K. Birth Control in a Midwestern City. *Milbank Quart.* 17, 2:152 (Apr.), 1939.

Truth Where It Hurts—Garbage-fed hogs spread trichinosis. It may be saving pennies to feed raw garbage to swine rather than to dispose of it by more sanitary methods, but it is costly in terms of human health—so says this authority.

WRIGHT, W. H. The Whole Truth About Hog Feeding. *Munic. San.* 10, 5:268 (May), 1939.

ASSOCIATION NEWS

SIXTY-EIGHTH ANNUAL MEETING

Pittsburgh, Pa., October 17-20, 1939

HEADQUARTERS — HOTEL WILLIAM PENN

RAILROAD FARES FROM VARIOUS POINTS TO PITTSBURGH, PA.

AMERICAN PUBLIC HEALTH ASSOCIATION
OCTOBER 17-20, 1939

From	One-way Pullman Travel	Round-trip Pullman Travel	One-way Lower	One-way Upper
Atlanta, Ga. ¹	\$23.75	\$42.50	\$5.80	\$4.40
Baltimore, Md.	9.05	18.10	2.65	2.00
Boston, Mass.	20.10	40.20	4.50	3.40
Buffalo, N. Y.	7.75	15.50	2.65	2.00
Chicago, Ill.	14.10	28.20	3.15	2.40
Cleveland, Ohio	3.95	7.90	2.10	1.60
Dallas, Tex.	38.24	64.50	10.00	7.60
Denver, Colo.	45.16	74.80	10.80	8.20
Detroit, Mich.	8.85	17.70	2.65	2.00
Duluth, Minn.	27.77	48.75	6.30	4.80
Fort Worth, Tex.	38.24	65.80	10.00	7.60
Indianapolis, Ind.	11.15	22.30	3.15	2.40
Jacksonville, Fla. ²	32.76	57.60	8.40	6.40
Kansas City, Mo.	26.90	48.90	6.30	4.80
Louisville, Ky.	12.80	25.60	3.15	2.40
Los Angeles, Calif.	79.65	118.50	19.70	15.00
Memphis, Tenn. ¹	24.20	43.40	6.30	4.80
Milwaukee, Wis.	16.65	32.05	3.15 ³	2.40
Minneapolis, Minn.	26.31	46.55	5.80	4.40
Nashville, Tenn. ¹	18.52	33.75	4.50	3.40
New Orleans, La. ¹	34.50	58.30	8.40	6.40
New York, N. Y.	13.15	26.30	3.15	2.40
Omaha, Nebr.	29.01	50.65	6.30	4.80
Philadelphia, Pa.	10.45	20.90	2.65	2.00
Portland, Ore.	78.44	118.50	19.70	15.00
Salt Lake City, Utah	58.89	87.55	13.95	10.60
San Francisco, Calif.	79.65	118.50	19.70	15.00
Seattle, Wash.	78.44	118.50	19.70	15.00
St. Louis, Mo.	18.55	37.10	4.50	3.40
Washington, D. C.	9.05	18.10	2.65	2.00
Montreal, Que. ⁴	21.00	42.00	5.55	4.20
Halifax, N. S. ⁴	41.95	83.90	9.30	8.00
Ottawa, Ont. ⁴	20.00	40.00	5.55	4.20
Quebec, P. Q. ⁴	26.65	53.30	5.55 ⁵	4.20
Toronto, Ont. ⁴	11.50	23.00	2.65 ⁶	2.00
Vancouver, B. C.	78.44	118.50	19.70	15.00

1. Via Cincinnati

2. Via Washington

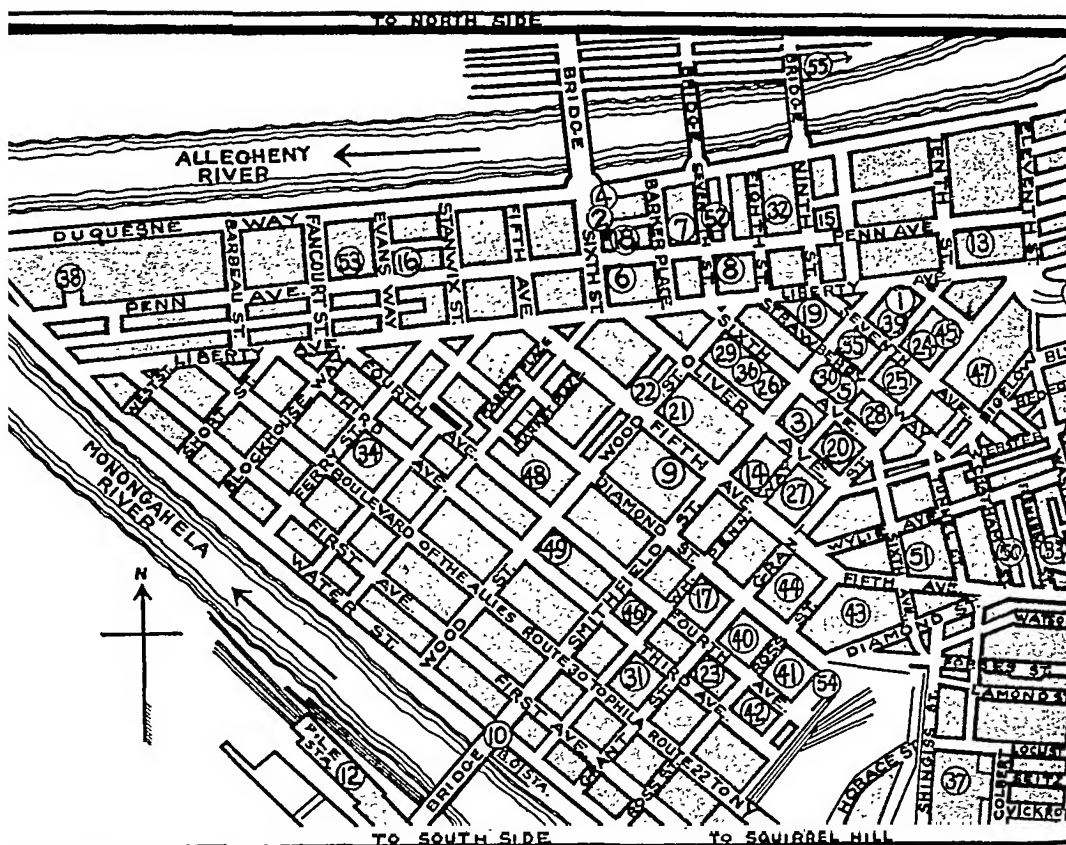
3. Pullman to Chicago only

4. Via Buffalo

5. Pullman to Montreal only

6. Pullman to Buffalo only

THE GOLDEN TRIANGLE PITTSBURGH, PA.



Courtesy of This Week in Pittsburgh

SHOWN ON THE MAP

THEATERS

- 1—Senator
- 2—Alvin
- 4—Fulton
- 5—Nixon
- 6—Penn
- 7—Barry
- 8—Stanley
- 9—Warner
- Art Cinema (Liberty & Eighth St.)

RAILROAD STATIONS

- 10—Baltimore & Ohio
- 11—Pennsylvania
- 12—Pgh. & Lake Erie
- 54—Fourth Ave. Station

HOTELS

- 13—Fort Pitt
- 17—Pittsburgher

- 18—Roosevelt
- 20—William Penn
- Keystone, Wood Street

PRINCIPAL BUILDINGS

- 21—Farmers Bank
- 22—First National Bank
- 23—Grant
- 24—Gulf
- 25—Koppers
- 26—Oliver
- 27—Union Trust
- 55—Heinz Plant
- Jenkins Arcade (Liberty & Penn)

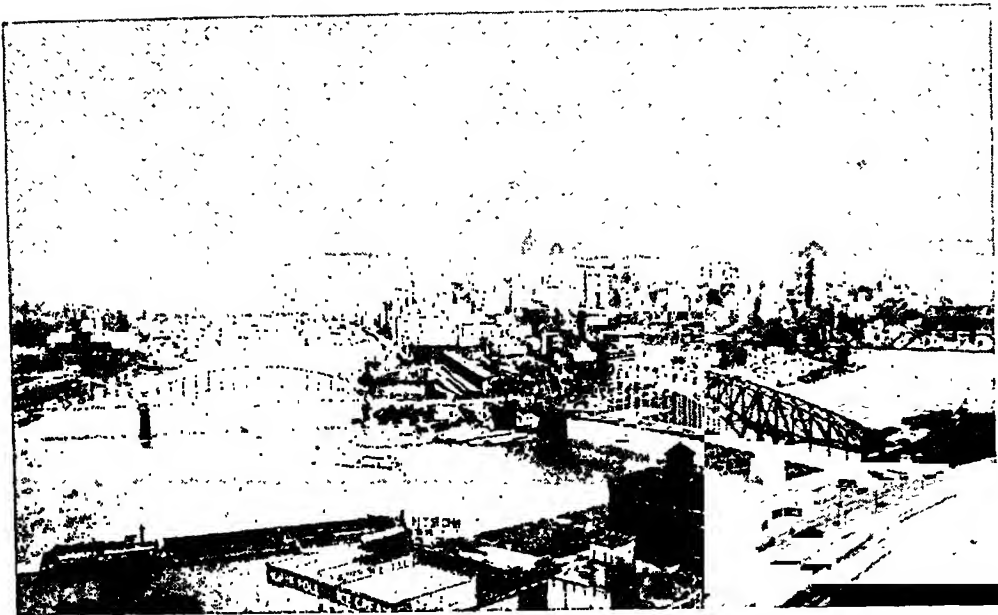
CHURCHES

- 28—First Lutheran
- 29—First Presbyterian
- 30—German E. P.
- 31—Salvation Army

- 32—Second Presbyterian
- 33—St. Peter's
- 34—St. Mary's Catholic
- 35—Smithfield M. E.
- 36—Trinity

PUBLIC BUILDINGS

- 37—Duquesne University
- 38—Block House
- 39—Chamber of Commerce
- 40—City-County
- 41—New County
- 42—County Morgue
- 43—County Jail
- 44—Court House
- 45—Federal Reserve
- 46—Old U. S. Post Office
- 47—New U. S. Post Office
- 48—Pgh. Stock Exchange
- 49—Y.M.C.A.
- 50—Y.W.C.A.



“The Golden Triangle” and the “Point.” The junction of the Allegheny and Monongahela Rivers to form the Ohio

PITTSBURGH HOTELS

Hotel	Room Capacity	Single Room		Double Room	
		Without Bath	With Bath	Without Bath	With Bath
William Penn Hotel	1,800		\$3.50-\$5.00		\$5.00-\$8.00
Roosevelt Hotel			2.50- 3.00		4.00- 4.50
The Pittsburgher	400		3.00- 4.00		4.50- 6.00
Hotel Schenley			3.50- 4.50		6.00- 8.00
Hotel Fort Pitt		\$1.50-\$2.00	2.50- 3.50	\$3.00	3.50- 6.00
Hotel Webster Hall	600	\$2.00	2.50- 3.50		5.00- 7.00
Hotel Keystone			2.50- 3.00		4.00- 7.00

.....(Cut off on this line and mail to the hotel of your choice).....

HOTEL RESERVATION BLANK FOR THE PITTSBURGH MEETING
AMERICAN PUBLIC HEALTH ASSOCIATION
OCTOBER 17-20, 1939

To
(Name of Hotel)

Please reserve for me rooms for persons
for the A.P.H.A. Meeting.

Single room Double room

Maximum rate per day for room \$..... Minimum rate per day for room \$.....

I expect to arrive If date of arrival is changed I will notify
you at least 24 hours in advance.

Please acknowledge this reservation.

Name

Street address

City State

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

- Evon L. Anderson, M.D., Front Street, Fort Benton, Mont., Chouteau County Health Officer
- Irving J. Bridenstine, M.D., Terry, Mont., Prairie County Health Officer
- Thomas H. Bruce, M.D., C.P.H., Court St., New Cumberland, W. Va., Hancock County Health Officer
- Major Henry F. Buettner, M.D., 5005 Edmondson Ave., Baltimore, Md., Health Officer, City Health Dept.
- Hugh E. Dierker, Jr., M.D., 7300 Santa Fe Ave., Los Angeles, Calif., Consultant Communicable Disease Physician, Los Angeles County Health Dept.
- Tilman E. Dodd, M.D., C.P.H., Kaufman, Tex., Director, Public Health District 3
- William H. Hutto, M.D., 408 Armstrong-Landon Bldg., Kokomo, Ind., Health Officer
- Louis Salazar, M.D., Kanakanak, Alaska, Government Physician, Office of Indian Affairs
- Raymond A. Steadman, M.D., Health Dept., Wartburg, Tenn., Health Officer, Morgan-Scott District Health Dept.
- Kolbein K. Waering, M.D., C.P.H., 2547 St. John's Ave., Jacksonville, Fla., Director, Duval County Health Unit
- William R. Warren, M.D., 511 Eaton St., Key West, Fla., City Health Officer

Vital Statistics Section

- Percy W. Weston, Division of Vital Statistics, Parliament Buildings, Victoria, B. C., Canada, Assistant Inspector of Vital Statistics

Laboratory Section

- Elizabeth Cober, M.S., 1419 Elm Street, Wilkensburg, Pa., Technician in Bacteriology, Western Pennsylvania Hosp.
- Harry P. Gelsing, B.S., 100 Chaucer St., Helena, Mont., Chief Bacteriologist, Hygienic Laboratories, State Board of Health
- Philip B. Hadley, Ph.D., Western Pennsylvania Hospital, Pittsburgh, Pa., Chief, Bacteriological Service and Research Bacteriologist, Institute of Pathology
- Edward P. Joneschild, D.V.M., Livestock Sanitary Board, Helena, Mont., Deputy State Veterinarian
- Anita H. Leavitt, B.S., 422 West Main St., Lansing, Mich., Bacteriologist, American Public Health Assn.
- Gregory Pincus, D.Sc., Biological Laboratories, Clark University, Worcester, Mass.

- George W. Shadwick, Jr., B.S., 1526 South State St., Chicago, Ill., Director, Control Laboratory, Beatrice Creamery Company.

Public Health Engineering Section

- Leslie Cummins, Route 1, Huntsville, Ala., Sanitation Officer, Madison County Health Dept.
- Samuel M. Ellsworth, B.S., 12 Pearl St., Boston, Mass., Consulting Sanitary Engineer
- Charles F. Haynes, D.V.M., Lexington Apartments, Helena, Mont., Deputy State Veterinarian, Livestock Sanitary Board
- H. George Henderson-Watts, P. O. Box 1514, Kelowna, B. C., Canada, Chief Sanitary Officer, District Health Unit
- Otto J. Schmidt, B.S. in C.E., 307 South University, Peoria, Ill., Assistant Sanitary Engineer, State Dept. of Health
- William Shea, P. O. Box 332, 305-3 St., N. W., Great Falls, Mont., Sanitary Commissioner, City-County Health Dept.
- Benjamin Yuk Wo Wong, B.S. in C.E., Board of Health, Hilo, Hawaii, Sanitary Engineer

Industrial Hygiene Section

- Louis W. Spolyar, M.D., State House Annex, Indianapolis, Ind., Chief, Bureau of Industrial Hygiene, State Board of Health

Food and Nutrition Section

- Paul A. Downs, Ph.D., 1301 North 38 St., Lincoln, Nebr., Teacher and Research Worker in Dairy Bacteriology, University of Nebraska

Child Hygiene Section

- Abraham B. Rosenfield, M.D., Hibbing High School, Hibbing, Minn., School Physician
- Lewis A. Scheuer, M.D., 247 Wadsworth Ave., New York, N. Y., Pediatrician, New York Foundling Hospital

Public Health Education Section

- Fred F. Fitzgerald, Ph.D., 230 Park Avenue, New York, N. Y., Director of Research, American Can Company
- James G. Stubblebine, M.D., Big Timber, Mont., Sweet Grass County Health Officer
- Ralph O. Wagner, D.D.S., 2940 Summit St., Oakland, Calif.

Public Health Nursing Section

- Ruth Cassidy, R.N., 120 West 5 St., Red Lodge, Mont., School Nurse

Isabelle R. Durie, Weston, W.Va., Lewis County Public Health Nurse
 Agnes Fuller, R.N., 303 Ninth Avenue, New York, N. Y., Supervisor, Chelsea Bureau of Nursing, Dept. of Health
 Clara H. Gaddie, R.N., C.P.H., Yakutat, Alaska, Field Nurse, Office of Indian Affairs
 Ella B. Jones, C.P.H., P. O. Box 1114, Eustis, Fla., Public Health Nurse, Lake County Health Dept.
 Anne M. Leffingwell, M.S., B.N., Lane County Health Dept., Eugene, Ore., Supervising Nurse
 Helen J. McMillen, State Dept. of Health, Santa Fe, N. M., Regional Consultant, Public Health Nursing
 Monica Moore, R.N., Metropolitan Life Insurance Company, Hempstead, L. I., N. Y., Territorial Supervisor
 Katherine M. Prusak, Governor Hotel, Olympia, Wash., Field Nurse, Taholah Agency, U. S. Indian Service
 Lucille A. Schulte, B.S., 1020 Liberty Bank Bldg., Dallas, Tex., Director, Visiting Nurse Assn.
 Mildred E. Simantel, Board of Education, District 2, Billings, Mont., Public School Nurse

Epidemiology Section

Irving R. Abrams, M.D., 6754 Sheridan Road, Chicago, Ill., Assistant Epidemiologist, Board of Health
 John E. Elmendorf, Jr., M.D., Rockefeller Foundation, 49 West 49 St., New York, N. Y., Member, Field Staff, International Health Division

Elsie G. Schlosser, M.D., Byram Shore, Port Chester, N. Y., Research Worker, Columbia University
 Tennyson B. Sinclair, M.D., Medical Faculty, McGill University, Montreal, Que., Canada, Student

Unaffiliated

Nettie E. Alley, St. Helens, Ore., Columbia County Nurse
 Louis Block, Dr.P.H., 435 2nd Ave., New York, N. Y., Health Consultant, New York City Works Progress Administration
 Martha O. Elliott, Box 44, Arlington, Calif., Student
 Peter J. Galante, M.D., Klamath Agency, Ore., Agency Physician, U. S. Indian Service
 William S. Johnson, A.B., Jacksonville Tourist and Convention Bureau, Jacksonville, Fla.
 Horace M. Kawamura, 1606 Kilauea Ave., Hilo, Hawaii, Junior Sanitary Inspector, Territorial Board of Health
 Shintara Namihira, 8½ Miles, Olaa, Hawaii, Junior Sanitary Inspector, Territorial Board of Health

DECEASED MEMBERS

Maurice Brodie, M.D., Detroit, Mich., Elected Fellow 1934, Elected Member 1932
 Leo H. Flynn, M.D., Eau Claire, Wis., Elected Member 1930
 Charles H. Mayo, M.D., Mayo Clinic, Rochester, Minn., Elected Member 1928
 Walter S. Stanley, San Antonio, Tex., Elected Member 1937

CLOSING DATE FOR ACCEPTING FELLOWSHIP APPLICATIONS

NOTICE is hereby given to any interested members that September is the closing date for accepting Fellowship applications for 1939 election. Eligible members wishing to apply for Fellowship this year should submit their completed applications as much in advance of this date as possible.

AMERICAN PUBLIC HEALTH ASSOCIATION WORLD'S FAIR EXHIBIT

AN additional contributor to the exhibit on Public Health Administration which the Association is sponsoring at the New York World's Fair is Hugh B. Robins, M.D.

EDUCATIONAL QUALIFICATIONS REPORTS

THE Committee on Professional Education of the American Public Health Association has, during the past two years, presented five reports which have been approved by the Governing Council. They deal with the Educational Qualifications of Public Health Statisticians, School Health Educators, Public Health Engineers, Sanitarians and Sub-Professional Field Personnel in Sanitation.

These are available for free distribution in printed form, from the offices of the A.P.H.A., 50 West 50th Street, New York. The first two are issued separately and the other three are printed under one cover.

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge.

Replies to these advertisements, when keyed, should be addressed to the American Public Health Association, 50 West 50th Street, New York, N. Y., identifying clearly the key number on the envelope.

POSITION AVAILABLE

Young woman bacteriologist to supervise industrial laboratory controlling paper manufacture and to conduct a factory hygiene program. Industrial experience desirable. **W419**

POSITIONS WANTED

HEALTH OFFICERS

Physician, M.D., class A medical school; M.S.P.H., University of Michigan, 1939; 10 years' experience in administrative full-time health programs; seeks public health administrative position. **A373**

Physician, aged 39; M.D. and Dr.P.H., Yale University; with excellent training in medicine, pediatrics and epidemiology; now specializing in public health education, will consider appointment in health education or administration. **A366**

Physician, M.D., Syracuse University; postgraduate studies in bacteriology and immunology, will consider position as health officer or epidemiologist. Has served as director of county health unit, director of industrial hygiene and medical statistics, and venereal disease field survey officer. **A305**

Physician, M.D., Yale; M.S. in field of public health, Columbia; also short course for health officers. Vanderbilt; good clinical background, 14 months' public health experience; will consider appointment in child health, epidemiology, or public health administration. **A350**

Experienced physician who has been local health officer and school physician in New York State, now has M.P.H. from Harvard School of Public Health, and wishes position in administration, epidemiology, or public medical service. **A423**

Physician, M.D., Columbia; experienced as county health officer and superintendent of health, seeks position in public health administration or medical executive work. **A396**

Physician, M.D., class A medical school; completed short course for health officers

at Vanderbilt; experienced health officer and director of county health unit, will consider appointment as health officer or school physician. **A320**

Well qualified physician, M.D., Rush; M.S.P.H., University of Michigan; with special interests in tuberculosis and venereal disease control, seeks responsible appointment. Excellent references. **A406**

Physician, M.D., class A medical school; 12 years' full-time public health experience; now employed with state department of health; will consider opening with well organized city or state department in communicable disease division or epidemiology or both. Mid-west preferred. **A409**

HEALTH EDUCATION

Well qualified woman in health education wishes position as health coordinator or health counselor. Has wide experience, and Ph.D. from New York University. **H236**

Young woman, M.A., Health Education, Teachers College, Columbia; with splendid international experience, seeks position as director of health education. **H369**

Young woman, Ph.D., Columbia University; splendid background of experience in health education, will consider position as director of public health education. **H294**

Woman, M.D., Boston University; special work Columbia and Massachusetts Institute of Technology; one year's experience in state hospital; interested in psychiatry, desires position in the East in hospital for mental diseases or industrial school. **H247**

Experienced teacher in public health and author; M.A., Columbia; now teaching public health nursing and carrying field promotion, wishes broader opportunity to train field personnel in extending health knowledge and interest to the general public, especially through group education, institutes, exhibits and rural programs. **H400**

LABORATORY

Capable research worker, Ph.D., trained at University of Southern California and Pasteur Institute, seeks position directing laboratory, in research work or field investigation. Has taught bacteriology, directed state hygiene laboratory and hospital laboratories. L315

Experienced laboratory director with background of dairy products manufacture and research in control methods; University of Wisconsin, M.S. and Ph.D., desires administrative position with food manufacturing or processing industry, or association with health department doing routine and research work in food control. L381

Chemist and bacteriologist, B.Sc.; M.S.P.H. from University of Michigan; experience in field work as chemist; serology training under Dr. Kahn at Ann Arbor, Mich. Three years' experience in public health laboratory work. Will consider position in public health field. L415

Young man, M.S.P.H., University of Michigan, knowledge of Medical Bac-

teriology and Public Health Sanitation, desires position in public or private health organization. L420

MISCELLANEOUS

Dentist, graduate of Temple University, with excellent postgraduate experience, desires position in administrative aspects of dental hygiene. M352

State Director of Dental Hygiene, graduate, experienced dentist, now serving a state for the third year as director of dental hygiene, will consider change of position. M421

Physician, M.D., class A medical school; training in obstetrics and public health. Experienced as director of county health department, teacher of clinical obstetrics and administrator of state maternal and child health program, desires position in public health obstetrics or in maternal and child health administration. C417

Engineer with good training and experience in water treatment, sewage plant operation and in research, wishes position as superintendent. Can go anywhere. E422

Situations Open

PUBLIC HEALTH PHYSICIAN—Man especially experienced in maternal and infancy work, capable heading department in state board; east. 70-PH, Medical Bureau, Pittsfield Building, Chicago.

SCHOOL PHYSICIAN—Young physician, interested in working with children, with flare for public health; duties will include assisting city health officer, though public health training not required; \$2,400, car maintenance allowance; southern preferred; city of 75,000. 71-PH, Medical Bureau, Pittsfield Building, Chicago.

YOUNG PHYSICIAN—Training in public health work available under auspices state department of health for young man interested in this field; summer course; prospect for health appointment upon completion of course excellent. 73-PH, Medical Bureau, Pittsfield Building, Chicago.

DIRECTOR IN SYPHILOLOGY—Well qualified public health man with experience in large cities required; special training in syphilis work not needed; eastern metropolis. 72-PH, Medical Bureau, Pittsfield Building, Chicago.

STUDENT HEALTH PHYSICIAN—Preferably man interested in graduate work in public health; state university noted for splendid public health course; some teaching. 75-PH, Medical Bureau, Pittsfield Building, Chicago.

SCHOOL NURSE—Graduate nurse eligible to teach hygiene course prescribed by American Red Cross to high school students; minimum bachelor's degree required; some attention to general health problems of school and assisting with physical education; small, live city; central Illinois. 77-PH, Medical Bureau, Pittsfield Bldg., Chicago.

Situations Wanted

PUBLIC HEALTH NURSE—Teacher's certificate from state teachers college; graduate training in public health nursing, University of Minnesota; 6 years, public health nurse; 3 years, chief supervising nurse, division of child hygiene; for further information, please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

HEALTH EDUCATOR—A.B., Wellesley; M.S. in public health from state university; 6 years, teaching physiology and science in public schools; 2 years, director of child health education, national organization; 2 years, health counselor and teacher of health education, midwest metropolis; 4 years' social work; for further details, please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

BACTERIOLOGIST—Desires position, preferably in public health laboratories; B.A.; eastern school; C.P.H. and Ph.D. (bacteriology), Yale University; has done considerable research; 4 years, bacteriologist and research technician, public health laboratories; for further details, please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

PUBLIC HEALTH PHYSICIAN—A.B., midwestern college; M.D., Johns Hopkins; M.S.P.H., University of Michigan; interesting record of successful experience including long term as school physician in fashionable suburb; for further information please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

NEWS FROM THE FIELD

WILLIAM HALLOCK PARK RESEARCH FUND

WILLIAM Hallock Park, M.D., of New York, N. Y., who died in April, set aside in his residuary estate a fellowship fund for research in medicine, clinical work and for the study of bacteriology and filterable viruses.

This fund is to continue in perpetuity and is to be known as the "William Hallock Park Research Fund."

ROBERT LIVINGSTON SEAMAN FUND

THE New York Academy of Medicine has announced the establishment of the Robert Livingston Seaman Fund to further research in bacteriology and sanitary science. The Fund has been established through the terms of the will of Dr. Robert Livingston Seaman, and \$600 is available for assignment this year.

Applications from institutions or individuals will be received up to September 15.

CHINESE EDITION OF NATIONAL HEALTH SERIES

THE new edition of the National Health Series, published by the National Health Council, of New York, N. Y., has now been translated into Chinese by Drs. K. E. Wu and C. L. Mei, and the entire Series has been published for the Nurses Association of China by the Kwang Hsueh Publishing House, Shanghai.

NEW YORK STATE ASSOCIATION OF PUBLIC HEALTH LABORATORIES

AT the 23rd Annual Meeting of the New York State Association of Public Health Laboratories, the following officers were elected:

President, Gilbert Dalldorf, M.D., Grasslands Hospital Laboratory; Vice-

President, Charles M. Carpenter, M.D., Rochester Health Bureau Laboratories; Secretary-Treasurer, Mary B. Kirkbride, Sc.D., State Laboratory, Albany; Members of the Council include Orren D. Chapman, M.D., Bureau of Laboratories, Department of Health, Syracuse, and Arthur W. Wright, M.D., Albany Hospital and Albany Medical College Laboratories.

CANCER RESEARCH AWARD

IT has been announced that the Anna Fuller Memorial Prize for cancer research has been awarded to five English scientists of the Research Institute at the Royal Cancer Hospital, London. This amount of \$7,500 will be shared equally by Ernest Laurence Kennaway, director of the institute; James Wilfrid Cook, Colin Leslie Hewett and Izrael Hieger, chemists; and William Valentine Mayneord, physicist.

The award is made upon the recommendation of the president of the American Medical Association, the dean of the Johns Hopkins Medical School, and the dean of the Harvard Medical School.

CHALMERS GOLD MEDAL

THE council of the Royal Society of Tropical Medicine and Hygiene in London has awarded the Chalmers Gold Medal for 1939 to Dr. Max Theiler, of the International Health Division of the Rockefeller Foundation, "in recognition of research of outstanding merit contributing to the knowledge of tropical medicine or tropical hygiene, particularly in reference to yellow fever and the possibility of producing the vaccine by the use of attenuated virus."

The medal was presented at the annual general meeting of the Society at Manson House, London, on June 15.

SOUTH DAKOTA ASSOCIATION CHANGES NAME

THE South Dakota Public Health Association has changed its name to the South Dakota Tuberculosis Association.

CHANGES IN SAVANNAH, GA.

ON November 3, 1938, there occurred the death of Dr. Victor H. Bassett, Health Officer for the City of Savannah and the County of Chatham, as well as that of Dr. Alfred Larson, the Assistant Health Officer. In the interim, Dr. T. H. D. Griffiths, Senior Surgeon, U. S. Public Health Service, and Director of the Henry R. Carter Memorial Laboratory, Savannah, was appointed Acting Health Officer until the appointment of Dr. Clarence D. Hart, who took office on April 7. After only three days' service, Dr. Hart died suddenly on April 10, 1939. Again Dr. Griffiths assumed the position of Acting Health Officer. On May 1, 1939, Dr. Charles C. Hedges, Senior Medical Officer of the Federal Trade Commission, Washington, and the former Health Officer of Isle of Wight, Nansemond and Suffolk Counties, Va., was appointed as Health Officer of Savannah and Chatham County, assuming his duties on May 8. Dr. Glenn J. Bridges has been appointed Assistant to Dr. Hedges.

PERSONALS

Central States

LAWRENCE A. BERG, M.D.,† formerly Director of the Menominee County, Mich., Health Department, has been appointed to take charge of the newly organized health unit of St. Joseph County, with headquarters in Centerville.

CONRAD ARNOLD ELVEHJEM, Ph.D.,† Professor of Agricultural Chemistry of the University of Wisconsin, Madison, Wis., was awarded a prize

of \$1,000 at the closing meeting of the American Institute of Nutrition in Toronto, April 26, for his discovery that nicotinic acid would cure pellagra.

BESS EXTON, C.P.H.,† has been appointed Assistant in Health Education on the staff of the American Association for Health, Physical Education and Recreation. Miss Exton was formerly Executive Secretary of the Genesee County Tuberculosis Association, Flint, Mich.

DR. MARCOS FERNAN-NUNEZ, Professor of Pathology and Bacteriology, of the Marquette University School of Medicine, Milwaukee, Wis., has been appointed Chairman of the Cancer Committee of the State Medical Society of Wisconsin, succeeding WILLIAM D. STOVALL, M.D.*

C. O. SAPPINGTON, M.D., DR.P.H.,* of Chicago, Ill., has been named winner of the W. S. Knudsen Award for the Most Outstanding Contribution to Industrial Medicine during 1938-1939, at the recent convention of the 24th Annual Meeting of the American Association of Industrial Physicians and Surgeons, at Cleveland, Ohio. The award was made on the basis of Dr. Sappington's new book, *Medicolegal Phases of Occupational Diseases*.

Eastern States

S. S. GOLDWATER, M.D.,* Commissioner of Hospitals of New York, N. Y., was awarded an Honorary degree of Doctor of Public Health by New York University at the June commencement.

RUTH E. GROUT,† formerly the Director of Health Education in Cattaraugus County, N. Y., has received the Ph.D. degree from Yale at the June commencement, and has accepted an appointment as Senior

* Fellow A.P.H.A.

† Member A.P.H.A.

Supervisor of Health Education in the Health and Safety Department of the Tennessee Valley Authority, Chattanooga. She has spent the past year at Yale under a fellowship from the American Association of University Women.

ANTHONY M. LOWELL, C.P.H.,[†] has resigned his position as Research Secretary with the Philadelphia, Pa., Health Council, in order to accept the position of Assistant Statistician in the Research Service of the New York City Tuberculosis and Health Association.

DR. ROBERT C. SELLEW has been appointed Health Officer of Canaan, Conn.

DR. CHARLES K. SKRECZKO, JR., has been appointed Health Officer of Shelton, Conn., to succeed DR. WILLIAM S. RANDALL.

WILSON G. SMILLIE, M.D., DR.P.H.,* Director of Public Health at the Cornell College of Medicine, New York, N. Y., was awarded an honorary degree of Doctor of Science by Colorado College, Colorado Springs, in June.

DR. JOSEPH S. STYGAR has been appointed Health Officer of Derby, Conn., to succeed DR. THOMAS F. PLUNKETT.

RICHARD W. WEISER, M.D., Medical Director of Public Schools in Kenmore, N. Y., has been appointed Executive Secretary of the Cincinnati Social Hygiene Society to succeed CARL A. WILZBACH, M.D.,* who recently became City Health Commissioner.

Southern States

DR. ONEAL L. ATKINSON has been appointed Health Officer of Hampton, Ark.

DR. MILLARD B. BETHEL, of Statesville, N. C., has been appointed Health Officer of Cabarrus County, succeeding DR. JOHN S. ANDERSON, resigned.

DR. OTHO C. BOWMER, of Corsicana, Tex., was recently elected Health Officer of Navarro County.

DR. FRANK B. BOYLE, of Big Springs, Tex., has been appointed Health Officer of Howard County.

GLENN J. BRIDGES, M.D., has been appointed Deputy Health Officer of the City of Savannah and County of Chatham, Ga.

DR. ROLAND A. BROWN, of Macon, Ga., has been appointed Assistant City-County Health Officer of Bibb County, succeeding DR. HERBERT F. LARAMORE, who has accepted a position on the staff of the U. S. Veterans' Hospital in Los Angeles.

DR. ALBERT S. J. CLARKE, formerly of Clarendon, has been transferred as Health Officer in charge of District No. 16, at Ozark, Ark.

DR. LEE E. EDENS has been appointed Health Officer of Austin, Tex., to succeed DR. DURWOOD L. DODD.

J. W. ERWIN, M.D.,[†] of Blountville, Tenn., has been appointed Health Officer of Sullivan County, to succeed FRED L. MOORE, M.D.,[†] resigned.

CHARLES C. HEDGES, M.D., of the Federal Trade Commission, Washington, D. C., assumed his duties on May 8 as Health Officer of Savannah, Ga., and the County of Chatham.

DR. WALTER O. McCAMMON, of Springfield, Ky., has been appointed Health Officer of Washington County, to succeed the late DR. WILLIAM R. THOMPSON.

DR. WILLIAM F. MCCARTHY has been appointed Health Officer of Jackson County, Mo.

FRAY O. PEARSON, M.D., C.P.H.,[†] of Livingston, Tenn., has been appointed Health Officer of Hamilton County, to succeed DR. JESSE C. ELDRIDGE, of Chattanooga, resigned.

LOWELL J. REED, Ph.D.,* Dean of the

* Fellow A.P.H.A.

† Member A.P.H.A.

School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Md., received the degree of Doctor of Science from the University of Maine at the June commencement.

RICHARD C. SHEPARD, M.D.,† of LaFayette, Ga., has resigned as Health Commissioner of Catoosa and Walker Counties, effective April 15, to engage in private practice.

DR. CHARLES M. SMITH, of Dixon, Ky., has resigned as Health Officer of Webster County.

DR. WILLIAM S. TERRY, JR., of Jefferson, Tex., was recently appointed Health Officer of Marion County.

DR. JAMES A. THRASH, of Columbus, Ga., Health Officer of Columbus and Muscogee Counties, has been elected Superintendent of the Muscogee County Tuberculosis Hospital.

ROY J. TURNER, M.D.,† has been appointed Health Officer of Fayetteville, Ark.

GARLAND L. WEIDNER, M.D.,† has been named Assistant Health Officer of Atlanta, Ga.

DR. ROBERT F. YOUNG, of Cartersville, Ga., has been appointed Commissioner of Health of Bartow County.

Western States

DR. JAMES D. COULTER, of Portola, Calif., has been appointed Health Officer of Plumas County.

DR. HARRY A. CRECELIUS, of Plains, Mont., has been appointed Physician and Health Officer of Sanders County.

DR. ENOS G. DENISON, of Sheridan, Wyo., has been appointed a member of the State Board of Health.

DR. JAMES L. FAULKNER, of Red Bluff, Calif., has been appointed Health Officer of Tehama County, succeeding DR. OTHO T. WOOD.

DR. RAY L. DRINKWATER, of Denver, has been appointed to a 6-year term on the Colorado State Board of

Health, succeeding DR. CHARLES A. DAVLIN, of Alamosa.

DR. WILLIAM E. FOUNTAIN, of Merced, Calif., has been appointed Health Officer of Merced County, succeeding DR. CLARENCE C. FITZGIBBON.

JACOB M. FURSTMAN, M.D.,* Health Officer of the Monrovia District, has been named administrative head of the Pomona Health District, Calif.

DR. ALBERT B. GRAY has been appointed Health Officer of Dorris, Calif., succeeding DR. PAUL F. DIEFFENBACHER.

DR. HARRY M. GRAYMAN has been appointed Health Officer of Dos Palos, Calif., to succeed DR. EDWIN A. PATTERSON.

CHARLES G. GROVER, D.D.S., of Denver, has been appointed to a 6-year term on the Colorado State Board of Health, succeeding DR. BEN BESHOAR, of Trinidad.

RAYMOND G. HOWE, D.D.S., of Casper, Wyo., has been appointed a member of the State Board of Health.

REUBEN L. KAUFMAN, M.D., C.P.H.,† for many years District Health Officer at Whittier, Calif., under the Los Angeles County Health Department, has been appointed Health Officer of Riverside County, to succeed the late WENDALL A. JONES, M.D.†

MARSHALL C. KEITH, M.D.,† of Casper, Wyo., Secretary of the Wyoming State Medical Society, has been appointed State Health Officer.

JOSEPH A. MYERS, an attorney of Denver, Colo., has been appointed to a 6-year term on the Colorado State Board of Health, succeeding H. C. DOLPH, D.D.S., of Denver. This is the first time an attorney has served as a member of the state board.

DR. DAVID G. SCHMIDT has been appointed Health Officer of Larkspur, Calif., succeeding DR. CORNWALL C. EVERMAN.

* Fellow A.P.H.A.

† Member A.P.H.A.

DR. GERALD E. STARK, of Coquille, Ore., has been appointed Health Officer of Coos County, succeeding CHARLES L. COYLE, M.D.,† of Grants Pass, resigned.

DANIEL P. TRULLINGER, M.D.,† of Oregon City, Ore., has been appointed Health Officer of Clackamas County, succeeding COURTNEY M. SMITH, M.D.,† resigned.

DR. GEORGE F. TURMAN, of Missoula, Mont., was named Chairman of the State Board of Health, succeeding DR. ENOCH M. PORTER, of Great Falls, at the Board's meeting in Helena, April 6.

FOREIGN

WALTER C. EARLE, M.D.,† of Cuernavaca, Morelos, Mexico, has been appointed Director of the Campaign-Urbana Health District, Illinois.

DEATHS

MAURICE BRODIE, M.D.,* of the Department of Laboratories, Providence Hospital, Detroit, Mich., died May 9, at the age of 35 years. He was formerly in charge of infantile paralysis research at the Bureau of Laboratories, New York City Health Department.

CLARENCE D. HART, M.D., C.P.H.,* formerly Director of the District Health Unit of Newberry, Mich., from April, 1935, to April, 1939, died in April, 3 days after reaching Savannah, Ga., where he was to have taken up his duties as Health Officer of the City of Savannah and Chatham County.

CHARLES H. MAYO, M.D.,† of the Mayo Clinic, Rochester, Minn., and for many years Health Officer of Rochester, died May 26.

* Fellow A.P.H.A.

† Member A.P.H.A.

CONFERENCES AND DATES

Air Conditioning Exposition: See International Heating and Ventilating Exposition.

American Association for the Advancement of Science. Summer Meeting, Section on Medical Sciences, held in collaboration with the American Neisserian Medical Society—Milwaukee, Wis., July 19–24. Annual Meeting—Columbus, Ohio, December 27, 1939–January 2, 1940.

American Congress of Physical Therapy. Hotel Pennsylvania, New York, N. Y. September 5–8. (Following Seminar in Physical Therapy for Physicians and Technicians, August 30–September 2.)

American Congress on Obstetrics and Gynecology—sponsored by the American Committee on Maternal Welfare, Inc. Municipal Auditorium, Cleve-

land, Ohio. September 11–15.

American Dietetic Association—22nd Annual Meeting. Hotel Ambassador, Los Angeles, Calif. August 27–31.

American Public Health Association. 68th Annual Meeting. Hotel William Penn, Pittsburgh, Pa. October 17–20.

American Society of Civil Engineers—Summer: San Francisco, Calif., July 26–29. Fall: New York, N. Y., September 4–9.

American Society of Heating and Ventilating Engineers. Semi-Annual Meeting 1939 (Great Lakes Summer Meeting). Grand Hotel, Mackinac Island, Mich. July 4–6.

American Standards Association. New York, N. Y. November 30–December 1–2.

American Statistical Association—An-

- nual Meeting. Philadelphia, Pa. December 27-30.
- Association of Dairy, Food and Drug Officials of the United States—43rd Annual Conference. Hartford, Conn. September 26-29.
- Biological Photographic Association—9th Annual Convention. Mellon Institute for Industrial Research, Pittsburgh, Pa. September 14-16.
- Colorado Public Health Association. Colorado Springs, Colo. October 3-4.
- Convention for the Revision of the Pharmacopoeia of the United States. Washington, D. C., May 14, 1940.
- Educational Frontiers, Conference on. School of Education Building, Stanford University, Calif. July 7-9.
- Florida Public Health Association. Jacksonville, Fla. December.
- International Association for Identification. Tulsa, Okla. September 11-14.
- International Association of Milk Sanitarians, Inc.—Annual Meeting. New Hotel Mayflower, Jacksonville, Fla. October 25-27.
- International Cancer Congress—Third. Haddon Hall Hotel, Atlantic City, N. J. September 11-16.
- International Congress of Microbiology—Third. Waldorf-Astoria Hotel New York, N. Y. September 2-9.
- International Heating and Ventilating Exposition—Sixth. Under auspices of the American Society of Heating and Ventilating Engineers, and coinciding with its 46th Annual Meeting. Lakeside Hall, Cleveland, Ohio. January 22-26, 1940.
- Michigan Public Health Association. Lansing, Mich. November 1-3.
- National Association for Nursery Education—Biennial Meeting. New York, N. Y. October 25-28.
- National Association of Sanitarians. Oakland, Calif. December.
- National County Officers' Association. Ogden, Utah. July 17-19.
- National Education Association, and affiliated organizations. San Francisco, Calif. July 2-6.
- National Institute for Traffic Safety Training (Second). University of Michigan, Ann Arbor, Mich. August 14-26.
- National Pest Control Association—7th Convention. Hotel Pennsylvania, New York, N. Y. October 23-25.
- National Recreation Congress—24th. Boston, Mass. October 9-13.
- National Safety Congress and Exposition—28th. Atlantic City, N. J. October 16-20.
- National Society for the Prevention of Blindness. Annual Conference. Hotel Astor, New York, N. Y. October 26-28.
- National Warm Air Heating and Air Conditioning Association. Cleveland, Ohio. January 22-26, 1940.
- Pacific Science Congress—Sixth. Under the auspices of the National Research Council. Oakland, Calif. July 24-August 12.
- Pan-Pacific Surgical Association—Third Congress. Honolulu, T.H. September 15-28.
- Southern California Public Health Association. Long Beach, Calif. January 24, 1940.
- Texas Public Health Association. Galveston, Tex. October 2-4.
- West Virginia Public Health Association. Hotel Fairmont, Fairmont, W. Va. November 6-8.
- Western Branch, A.P.H.A. Tenth Annual Meeting. Hotel Oakland, Oakland, Calif. July 23-28.

Canada

- International Hospital Association. Toronto, Ont. September 19-23.
- American College of Hospital Administrators. Toronto, Ont. September 24-25.
- American Hospital Association. Toronto, Ont. September 25-29.

FOREIGN

- Fifth National Medical Congress of Uruguay. Montevideo, Uruguay. Summer of 1939.
- Summer Course of Phthisiology. Under direction of Professor Eugenio Morelli. Carlo Forlanini Institute, Rome, Italy. July 15–October 15.
- International Malaria Course for 1939. Under direction of Professor Giuseppe Bastianelli. Ettore Marchiafava Institute of Malariology, Rome, Italy. July 24–September 20.
- Fifth International Congress on Life-Saving and First-Aid to the Injured. Zurich, and St. Moritz, Switzerland. July 23–28.
- World Federation of Education Associations, Eighth Biennial Congress. Rio de Janeiro, Brazil. August 6–11. (SS. Rotterdam Summer Cruise to South America: from New York, July 5; from New Orleans, July 10; returning to New York August 27.)
- International Congress of Public Health and Public Safety. Liege, Belgium. August 12–15.
- Third International Neurological Congress. Copenhagen, Denmark. August 21–25.
- International Congress on Public Cleansing. Vienna, Austria. August 24–28.
- Eighth Pan American Child Congress. San Jose, Costa Rico. August 28–September 4.
- International Conference on Sewage Works and Disposal. Glasgow, Scotland. September 12–18.
- Intergovernmental Conference of American Countries on Rural Hygiene. Mexico City, Mexico. End of 1939 (postponed from November 10, 1938).
- International Management Congress. Stockholm, Sweden. 1941.

Best Sellers in the Book Service for June

Community Health Organization—Ira V. Hiscock.....	\$2.50
Immunity: Principles and Application in Medicine and Public Health—Hans Zinsser, John F. Enders and LeRoy D. Fothergill.	6.50
Health Education by Isotype—Otto Neurath and H. E. Kleinschmidt. ....	.25
Principles of Health Education. 2nd ed.—C. E. Turner.....	2.00
Bergey's Manual of Determinative Bacteriology. 5th ed.—David H. Bergey, Robert S. Breed, E. G. D. Murray and A. Parker Hitchens.....	10.00
Preventive Medicine and Hygiene. 6th ed.—Milton J. Rosenau..	10.00
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Results of Bacterial Plate Counts of Milk on Three Media and at Two Temperatures of Incubation

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THE publication of the Seventh Edition of *Standard Methods for the Examination of Dairy Products*, in which is prescribed a change in culture medium from the present standard nutrient agar to a new standard nutrient agar known as tryptone-glucose-extract-milk agar, makes it desirable to present the reasons for this change.

Those who have been active in seeking improvements in the culture medium for the bacteriological plating of milk and dairy products are familiar with the various developments antecedent to the present study conducted by the Committee on Standard Methods for the Examination of Dairy and Food Products. In order that others may understand the motives and objectives of the committee, the following brief history is presented.

INTRODUCTION

Comparative studies with agars of different composition and with different temperatures of incubation were carried

out under the auspices of the American Public Health Association before the first edition of *Standard Methods of Milk Analysis* was published in 1910. Again in 1915 Conn¹ conducted a comparative study of plate count results in four laboratories, using two modifications of the standard nutrient agar prescribed by the "Standard Methods Report" of that period. His conclusions were to the effect that the modifications employed in making media had a minor effect upon the plate count, as compared with such other factors as differences in technic. Hatfield² and Kilbourne³ conducted similar studies in 1918 with parallel results.

The composition of the culture medium continued a subject for discussion and study, and important changes were made in the second, third, fourth, and fifth editions. The composition of the agar remained unchanged in the sixth edition, but there was general appreciation of the fact that the agar in use was unsatisfactory in several respects.

In 1934 Bowers and Hucker presented a preliminary report of a study of the effect of the substitution of yeast extract for beef extract in the standard nutrient agar formula, and also of the effect of the addition of a fermentable carbohydrate. The substitution of yeast extract did not materially increase the count, but it was found that the addition of glucose to standard nutrient agar resulted in an appreciable increase in count and also increased the colony size. In March, 1935, these authors published a report of a more extensive study on the composition of culture media for the bacteriological examination of milk.⁵ On the basis of their findings they suggested the use of a medium for the grading of milk by counts, to consist of 0.5 per cent tryptone (a casein digest peptone), 0.1 per cent glucose, 0.5 per cent skim milk, and agar.

In May, 1935, Breed⁶ as Chairman of the Committee on Standard Methods of Dairy and Food Products, urged milk control laboratory directors to prepare and use this and other suggested media in comparison with standard nutrient agar.

Since 1921 the literature has been interspersed with discussions of and references to the effect upon bacterial plate counts of milk, of irregularities in the temperature of incubation caused by inefficient incubator construction.⁷⁻¹³ These led to an organized study of the construction of bacteriological incubators, and the effect of various methods of loading upon the temperatures of individual plates.¹⁴ This work was followed by a study of the effect of carefully controlled specific temperatures ranging from 21°C. to 55°C., upon the plate counts of the same sample of milk.¹⁵ The latter investigators, Pederson and Yale, found that the apices of most of the plotted curves of maximum average plate counts occurred at 32°C \pm 2°; and they recommended

the adoption of this incubation temperature as the standard. It was pointed out that higher counts are obtained at 32°C., yielding a truer measure of milk quality; that there is a smaller error in counts occasioned by temperature variation in incubators operated at this temperature; and that the constancy of counts on split samples incubated at 32°C. is greater than that of those incubated at 37°C.

It will be observed that these developments in composition of culture media and temperatures of incubation were somewhat coincidental. Proposals for changes in Standard Methods resulting therefrom aroused widespread interest and discussion, both within the milk industry and among milk control authorities, and were the inspiration for a number of studies and reports.¹⁶⁻¹⁹ Meanwhile, independently of these studies on the composition of standard agar, a medium was developed by the American Association of Medical Milk Commissions for the plating of certified milk, and a coöperative study of the effect of this medium as compared with standard nutrient agar on milk plate counts, was conducted and reported.²⁰

The studies stimulated by the present Committee on Standard Methods with so-called T-G-M agar (Tryptone-glucose-skim milk agar) were summarized for the committee by Yale.²¹ In all of these studies, published and unpublished, a certain number of samples yielded higher counts on the old standard agar. Unpublished experimental work carried out under the auspices of the committee having indicated that a return to the use of beef extract would lessen the number of instances where counts on the old agar were higher, the committee decided to make the studies reported upon in this paper with T-G-E-M agar (Tryptone-glucose-extract-milk agar). As this agar contains the same amount of beef extract as the present standard agar it re-

sembles this agar more closely than does the T-G-M agar. It was also decided to include the A.A.M.M.C. agar, as recommended in its latest formula, in this official study. The latter agar also contains beef extract. Incubation of all plates was to be carried out at 37°C. and at 32°C.

PART I

AGAR FORMULAE

The formula of the T-G-E-M agar used in this study was as follows:

T-G-E-M Agar	
Bacto-Tryptone	5 gm.
Bacto-Beef Extract	3 gm.
Glucose	1 gm.
Skim milk	10 cc. (where dilutions were greater than 1:10).
Agar	15 gm.
Water	1,000 cc.
Reaction pH 7.0	

Then, because of the similarity of the latest form of the A.A.M.M.C. agar, in both composition and reported effect, this medium was also included in the study. The composition of the A.A.M.M.C. agar was:

Nutri Peptone	10 gm.
Beef Extract	3 gm.
Dextrose	1 gm.
Salt	5.0 gm.
Agar	15 gm.
Water	1,000 cc.
Reaction pH 7.0 to 7.2	

The "Tryptone" peptone used in the T-G-E-M agar is a digested casein that has been on the market for a number of years. It has generally been found to be a very satisfactory peptone and was thought to be an especially desirable peptone for use in growing organisms found in milk.

With respect to the temperature of incubation, it was recognized to be the

function and obligation of the committee to determine the degree to which the adoption of 32°C. incubation affects counts, and to what extent it would disturb existing concepts of milk quality standards, and to consider the practicability and expediency of the adoption of this temperature of incubation as the standard procedure.

PRIMARY REQUISITES FOR THE STUDY PROCEDURE

Cone's¹⁷ comments on the findings of Kelly¹⁶ impressed upon the committee the imperative need for uniformity of conditions and procedure in the conduct of this study in a number of public health laboratories. Accordingly, an Outline of Procedure, prescribing adherence to the instructions of Standard Methods, 1934, and amplified by insistence upon the following specific requirements, was formulated:

1. Calibrated pipettes
2. Level marked dilution containers
3. Equipment and materials for determining the reaction of media colorimetrically, or more accurately, if preferred
4. Accurately tempered media (when poured)
5. A 32° C. and a 37° C. incubator maintained at constant temperatures
6. Standardized thermometers
7. A Quebec Colony Counter, or other satisfactory illuminating and counting device
8. Breed-count pipettes, slides, and staining equipment
9. Competent and reliable personnel

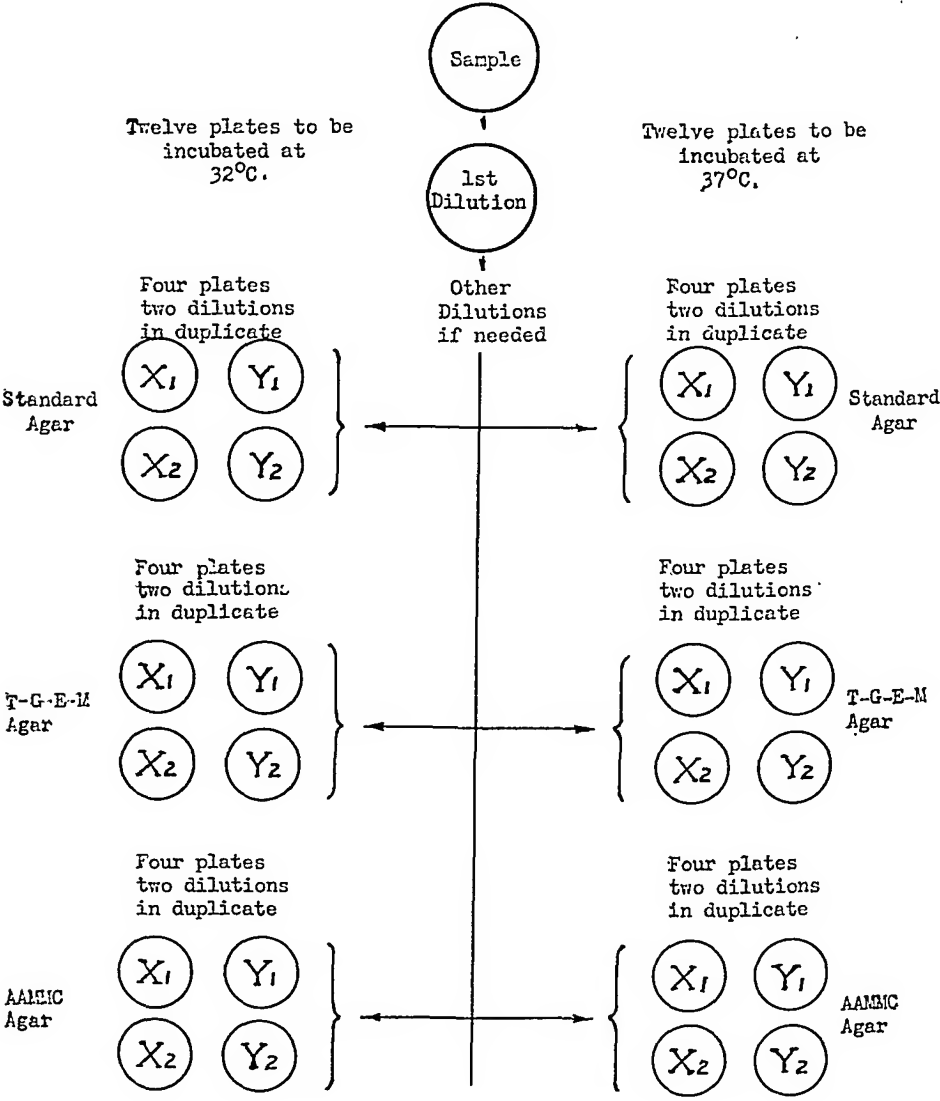
A report-form was devised providing blanks for identification of each sample; its nature, age, and temperature when collected and when plated; type of pipettes and method of dilution employed; reaction and temperature of media when poured; temperature readings of three thermometers kept in the incubators, at intervals during the incubation period; the nature of the counting device used; and, finally, the plate count results. Two sets of plates

of two dilutions each, of each agar and at each temperature under test, were prescribed. The lay-out for any one sample is given in the accompanying schematic chart. (Spaces for reporting dilution counts were lettered on the report form to correspond to the lettered plates in this chart.)

The pouring and counting of two sets of plates was prescribed in order to enable the Referee to judge the accuracy of results in terms of correspondence in count between the duplicate sets of plates, and thus to be in position to discard results of a dubious nature.

SCHEMATIC CHART FOR PLATING SAMPLES

Instructions: Use 1.0 cc. of dilution water in each of the "X" plates, whatever the degree of dilution.
Use either 0.1 cc. of the same dilution, or 1.0 cc. of the next higher dilution, in each of the "Y" plates:



COÖPERATING LABORATORIES

Preliminaries having been completed, the directors of 48 public health laboratories were invited to participate in the study. Although 10 found themselves in position to do so and accepted the invitation, only 7 really participated in the study and filed reports. The numbers and natures of the samples examined by the participating laboratories are given in the Tabulation A.

It is quite obvious that in the cases of raw certified milk, raw certified cream, and pasteurized certified milk, the numbers of sample results sub-

City Health Department, St. Louis, Mo., Dr. Joseph C. Willett, Chief of Laboratories; J. Lazarov, Bacteriologist

Bureau of Health, Portland, Ore. Dr. Leigh H. Churchill, City Bacteriologist; Wilfred C. Kennell, City Chemist

Bacteriological and Serological Laboratories, Department of Health, Louisville, Ky., Dr. James A. Kennedy, Director; W. L. Williams, Sanitary Bacteriologist

Ontario Department of Health Branch Laboratory, Ottawa, Ont. Dr. Frank S. Letts, Director; J. Baron, Assistant Bacteriologist.

New York State Department of Health, Bureau of Milk Sanitation, W. D. Tiedeman, Chief; N. J. Hohl, Bacteriologist Mobile Laboratory.

TABULATION A

SOURCES AND NATURES OF SAMPLE REPORTS

Laboratory	Cert. Milk Raw	Cert. Cream Raw	Milk Raw	Milk Past.	Cream Past.	Cert. Milk Past.	Total
A	0	0	0	15	0	0	15
B	0	0	0	50	12	0	62
C	1	5	23	72	8	0	109
D	11	0	5	21	3	5	45
E	0	0	2	48	0	0	50
F	3	0	1	41	0	0	45
G	0	0	9	0	0	0	9
Totals	15	5	40	247	23	5	335

mitted are too small to yield analyses of statistical significance. This is true also, though to a lesser extent of raw milk and pasteurized cream. Consequently, the deductions submitted in this report are based mainly upon the analyses of the results of the platings of pasteurized milk.

The laboratories participating in this study (the names of which are purposely not listed in the order in which laboratory designations appear in the tabulations) are:

Bureau of Laboratories, Detroit Department of Health, Detroit, Mich. Dr. Joseph A. Kasper, Director; Gail A. Smith, laboratory medical aid

Division of Bacteriology, New York State Experiment Station (Cornell University), Geneva, N. Y., Dr. G. J. Hucker, Chief in Research; William Walter, Bacteriologist

VISÉ OF REPORTS RECEIVED

The desirability of checking every report very carefully before classifying and recording the results was indicated before the study had proceeded far. It was also evident that arbitrary rules for deciding upon the results to be used and those to be discarded must be adopted. Because of the fact that the Outline of Procedure formulated for this study prescribed duplicate sets of plates of two dilutions each, the directions for arriving at the final count given in Standard Methods, 1934, do not clearly cover some of the situations encountered. Consequently, the following rules of procedure governing acceptance or rejection of counts, to be applied in addition to those of Standard Methods, were arbitrarily adopted and adhered to:

1. Counts based only upon obviously overgrown (over 400 colonies) or underdeveloped or too highly diluted (less than 20 colonies) plates were to be discarded.

2. When the ratio of the calculated counts on the two plates (X1 and X2, or Y1 and Y2) of either set exceeded 1:2.5, the final count was to be discarded.

3. When the computed final counts of the two sets of plates varied to an extent that the deviation of each from their mean exceeded 25 per cent of the mean, the final count was to be discarded.

The application of these rules, liberal as they may appear, resulted in the discarding of a number of the counts reported. Where necessary, corrections were made of arithmetical errors in the

reported counts and to adhere to *Standard Methods of Milk Analysis* procedures.

NATURE OF THE FINDINGS

Graphic presentation of the results reported, whenever possible and practical, has been followed in the preparation of this report. "Scatter" diagrams on a semi-logarithmic scale, have been employed to demonstrate the dispersion or "scatter" of counts obtained on the several media and at the two temperatures of incubation studied. Every count on standard agar at 37°C. is hypothetically located on the zero abscissa of the chart at the point on the

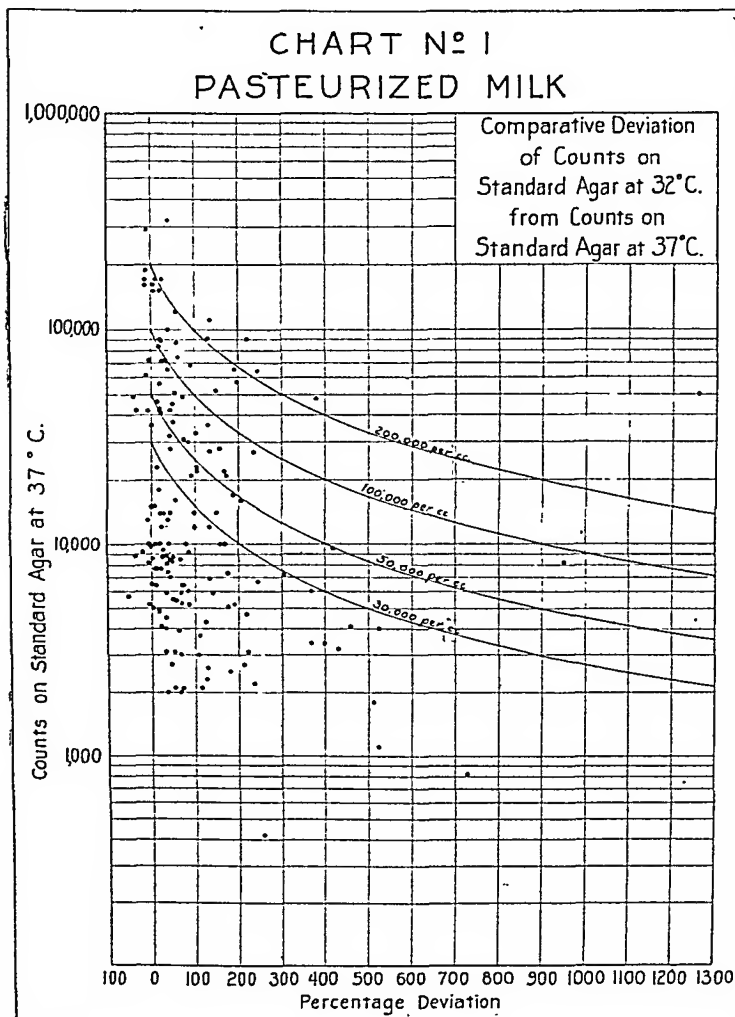


CHART No. 1—Deviation of counts on Standard Agar, at 32° C. from those on Standard Agar, at 37° C. 166 Counts. Average deviation: +64.3%.

Cumulative Deviations: Counts under 5,000 per cc., +164.0%; under 10,000 per cc., +104.7%; under 25,000 per cc., +95.1%; under 50,000 per cc., +115.4%; under 100,000 per cc., +98.3%; under 200,000 per cc., +70.0%; under 500,000 per cc., +64.3%.

Counts Exceeding Limit Because of Increase: 30,000 per cc., 13.1%; 50,000 per cc., 12.8%; 100,000 per cc., 9.1%; 200,000 per cc., 43%.

TABULATION B

INDIVIDUAL DEVIATIONS OF COUNTS OF PASTEURIZED MILK ON STANDARD AGAR AT 32° C.

Range	Total	Increased	Per cent	Decreased	Per cent	Identical	Per cent
Under 5,000	35	35	100.0	0	0.0	0	0.0
5,100- 10,000	52	44	84.6	6	11.5	2	3.9
11,000- 25,000	23	21	91.4	1	4.3	1	4.3
26,000- 50,000	23	19	82.7	3	13.0	1	4.3
51,000-100,000	20	18	90.0	2	10.0	0	0.0
110,000-200,000	11	8	72.7	3	27.3	0	0.0
210,000-500,000	2	1	50.0	1	50.0	0	0.0
Totals	166	146	88.0	16	9.6	4	2.4

ordinate corresponding to its magnitude. This is the "norm" so termed by Kelly,¹⁶ and is the base from which the deviation of the count on the same sample, under the specific conditions studied, is measured.

Caution must be exercised to avoid an erroneous impression of the grouping of the points representing percentages of deviation on these charts. If the whole chart were in each case constructed on the scale applying to the range 1,000 to 10,000, it would be over 16 feet long, and the points above 10,000 would be proportionately more widely scattered.

Wherever coincidence of results was encountered it is indicated by the insertion of numbers applying to this point on the chart.

Standard Agar at 32°C.—Chart 1 presents the extent of the deviation of individual counts of pasteurized milk on standard agar at 32°C., from the counts of the same samples on standard

agar at 37°C. One hundred and sixty-six counts are located. The deviations range from minus 56 per cent to plus 1,260 per cent. The deviations are tabulated by ranges of magnitudes, as shown in Tabulation B.

The average deviation of all of the 166 counts at 32°C. from those at 37°C.—not the average of the percentage deviations—was 64.3 per cent upward. The average deviation in each range of magnitude, and by laboratories, is given in the recapitulations of Table I.

T-G-E-M Agar at 37°C.—Chart 2 presents the extent of the deviation of individual counts of pasteurized milk on T-G-E-M agar, at 37°C., from the counts on the same samples on standard agar, at 37°C. One hundred and ninety-three counts are located. The deviations range from minus 49 per cent to plus 1,600 per cent. (This deviation on a count of 4,000 on standard agar at 37°C., and also one of

TABULATION C

INDIVIDUAL DEVIATIONS OF COUNTS OF PASTEURIZED MILK ON T-G-E-M AGAR AT 37° C.

Range	Total	Increased	Per cent	Decreased	Per cent	Identical	Per cent
Under 5,000	49	46	93.9	3	6.1	0	0.0
5,100- 10,000	58	48	82.8	10	17.2	0	0.0
11,000- 25,000	24	18	75.0	2	8.3	4	16.7
26,000- 50,000	27	22	81.5	5	18.5	0	0.0
51,000-100,000	21	17	81.0	4	19.0	0	0.0
110,000-200,000	11	6	55.5	4	36.4	1	9.1
210,000-500,000	3	2	66.7	1	33.3	0	0.0
Totals	193	159	82.4	29	15.0	5	2.6

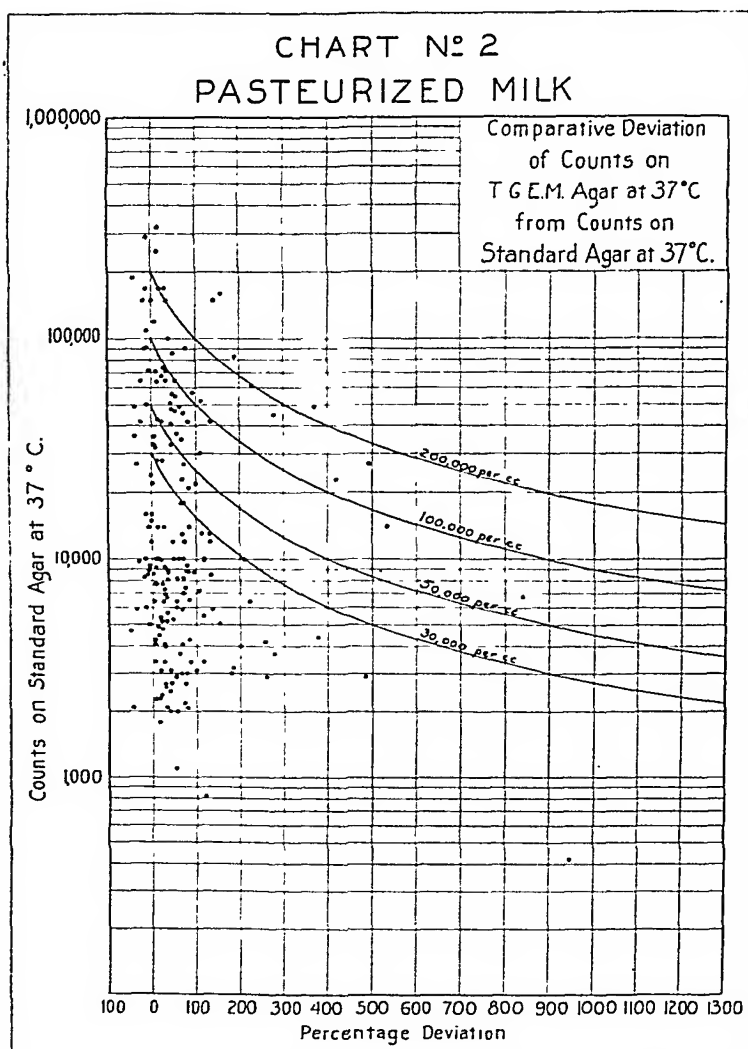


CHART No. 2—Deviation of counts on T-G-E-M Agar, at 37°C., from those on Standard Agar, at 37°C. 193 Counts. Average deviation: +48.0%.

Cumulative Deviations: Counts under 5,000 per cc., +127.0%; under 10,000 per cc., 93.9%; under 25,000 per cc., +92.2%; under 50,000 per cc., +81.7%; under 100,000 per cc., +67.8%; under 200,000 per cc., +54.7%; under 500,000 per cc., +48.0%.

Counts Exceeding Limit Because of Increase: 30,000 per cc., 10.2%; 50,000 per cc., 11.4%; 100,000 per cc., 6.7%; 200,000 per cc., 3.2%.

1,329 per cent on a count of 7,700 are not shown in this chart.) The numbers of deviations are tabulated, by ranges of magnitudes, as shown in Tabulation C.

The average deviation of all the 193 counts on T-G-E-M agar at 37°C. was 48.0 per cent upward. The average deviation in each range of magnitude and by laboratories, is given in the recapitulations of Table I.

The greater concentration or lesser dispersion, of points between the norm and plus 50 per cent deviation is to be noted on this chart when compared with Chart 1.

T-G-E-M Agar at 32°C.—Chart 3 presents the extent of deviation of individual counts of pasteurized milk on T-G-E-M agar, at 32°C. from the counts on the same samples on standard agar at 37°C. One hundred and sixty-six counts are located. The deviations range from minus 36.8 per cent to plus 1,110 per cent. The numbers and directions of deviations, by ranges of magnitudes, are tabulated as shown in Tabulation D.

The average deviation of all the 166 counts on T-G-E-M agar at 32°C. from those on standard agar, at 37°C., was 113.7 per cent upward. The average

TABULATION D

INDIVIDUAL DEVIATIONS OF COUNTS OF PASTEURIZED MILK ON T-G-E-M AGAR AT 32° C.

Range	Total	Increased	Per cent	Decreased	Per cent	Identical	Per cent
Under 5,000	36	36	100.0	0	0.0	0	0.0
5,100- 10,000	50	50	100.0	0	0.0	0	0.0
11,000- 25,000	24	24	100.0	0	0.0	0	0.0
26,000- 50,000	25	24	96.0	1	4.0	0	0.0
51,000-100,000	18	18	100.0	0	0.0	0	0.0
110,000-200,000	11	7	63.6	4	36.4	0	0.0
210,000-500,000	2	1	50.0	1	50.0	0	0.0
Totals	166	160	96.4	6	3.6	0	0.0

deviation, in each range of magnitude, and by laboratories, is given in the recapitulations of Table I.

by the use of T-G-E-M agar and incubation at 32°C., is made strikingly evident by a comparison of Chart 3, with Charts 1 and 2. The scatter to

The very general increase in count

CHART No. 3—Deviation of counts on T-G-E-M Agar, at 32° C., from those on Standard Agar, at 37° C. 166 Counts. Average deviation: +133.7%.

Cumulative Deviations: Counts under 5,000 per cc., +267.8%; under 10,000 per cc., +205.3%; under 25,000 per cc., +201.5%; under 50,000 per cc., +196.4%; under 100,000 per cc., +162.6%; under 200,000 per cc., +122.4%; under 500,000 per cc., +133.7%.

Counts Exceeding Limit Because of Increase: 30,000 per cc., 24.1%; 50,000 per cc., 25.9%; 100,000 per cc., 15.0%; 200,000 per cc., 8.5%.

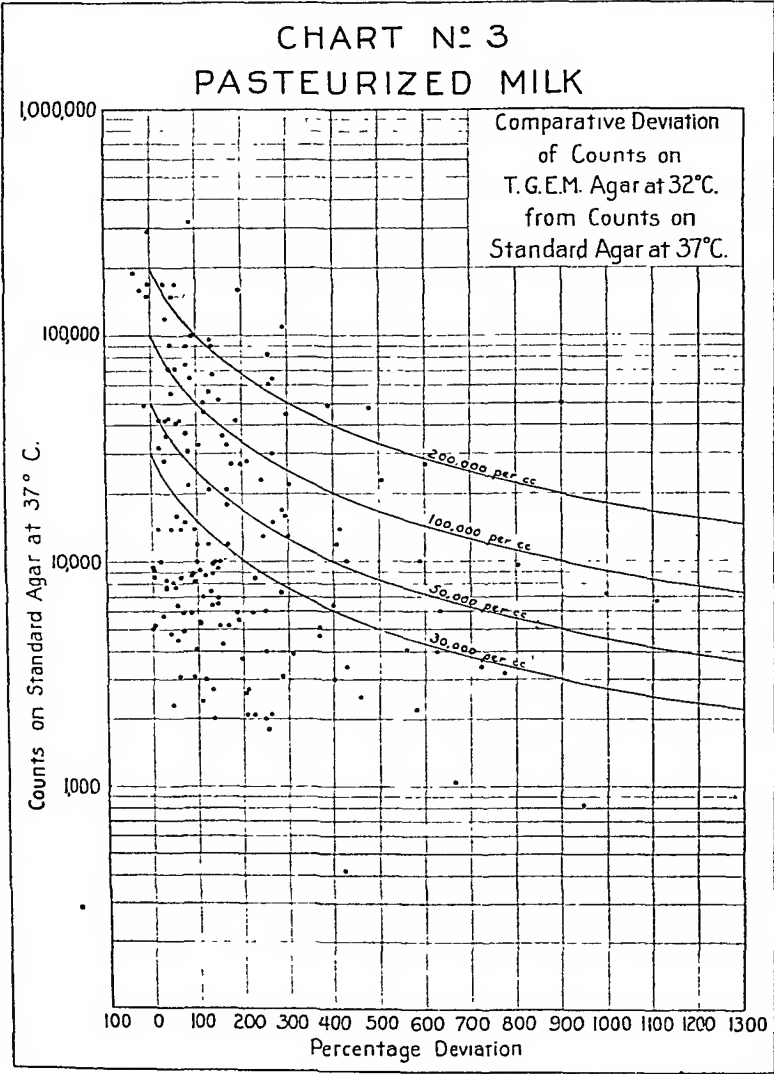


TABLE I
Analysis of Plate Counts of Pasteurized Milk
Made on
Three Agars, at Two Incubation Temperatures,
By
Magnitudes of Counts on Standard Agar at 37° C., and by Laboratories
Agars and Incubation Temperatures

Laboratory	Standard Agar at 37° C.				T-G-E-M Agar at 32° C.				A.A.M.M.C. Agar at 37° C.				A.A.M.M.C. Agar at 32° C.			
	No. Avg. Count		No. Avg. Count % Dev.		No. Avg. Count % Dev.		No. Avg. Count % Dev.		No. Avg. Count % Dev.		No. Avg. Count % Dev.		No. Avg. Count % Dev.		No. Avg. Count % Dev.	
	Counts of 5,000 or Less		Counts from 5,100 to 10,000 Inclusive		Counts from 11,000 to 25,000 Inclusive		Counts from 26,000 to 50,000 Inclusive		Counts from 51,000 to 100,000 Inclusive		Counts from 101,000 to 250,000 Inclusive		Counts from 251,000 to 500,000 Inclusive		Counts from 501,000 to 1,000,000 Inclusive	
A	5	2,820	5	8,760	5	5,220	5	13,640	5	5,725	5	10,920	5	5,725	5	322.5
B	12	3,808	10	5,560	12	5,425	11	7,327	12	5,517	12	7,117	12	5,517	12	322.5
C	8	2,305	8	10,588	8	2,800	8	12,388	8	2,226	8	10,743	8	2,226	8	97.2
D	12	3,025	12	8,150	12	5,233	12	9,792	12	3,075	12	8,267	12	3,075	12	447.0
E	12	3,525	12	8,150	12	5,233	12	9,792	12	3,075	12	8,267	12	3,075	12	173.0
F	12	3,525	12	8,150	12	5,233	12	9,792	12	3,075	12	8,267	12	3,075	12	173.0
Total	49	3,152	35	8,054	49	7,153	36	11,068	46	5,320	46	8,733	36	5,320	36	193.0
A	1	6,700	1	23,000	1	63,000	1	81,000	1	13,000	1	28,000	1	13,000	1	318.0
B	7	8,114	7	25,571	7	10,757	6	26,250	6	9,633	6	42,000	6	9,633	6	423.0
C	19	7,889	19	11,363	19	8,690	18	13,780	18	8,516	18	12,384	18	8,516	18	64.0
D	5	5,820	5	9,160	5	7,920	5	11,880	5	6,680	5	8,800	5	6,680	5	51.2
E	20	7,805	20	14,440	20	15,340	20	28,650	20	11,095	20	19,295	20	11,095	20	147.0
F	6	8,117	6	14,440	6	27,833	6	28,650	6	21,383	6	19,295	6	21,383	6	147.0
Total	71	7,712	52	14,472	58	14,082	50	22,654	56	11,004	56	18,904	50	11,004	50	146.4
A	2	18,000	3	45,333	2	66,500	3	75,667	3	36,000	3	70,000	3	36,000	3	269.2
B	8	16,250	10	30,800	8	19,875	10	41,900	10	16,890	10	39,444	9	16,890	9	135.1
C	4	16,000	3	15,000	4	26,000	4	33,250	4	20,500	4	28,000	4	20,500	4	75.0
D	3	13,000	3	27,000	3	22,667	3	34,333	3	20,167	3	24,333	3	20,167	3	87.0
E	4	19,000	4	27,250	4	54,500	4	74,750	4	22,500	4	34,250	4	22,500	4	80.3
F	3	18,333	3	25,333	3	25,333	3	38.2	3	17,500	3	34,250	3	17,500	3	80.3
Total	24	16,667	23	29,522	24	31,583	24	49,208	26	20,938	26	38,565	23	20,938	23	131.6
A	6	38,333	4	107,250	6	105,500	6	156,333	6	122,000	6	125,750	4	122,000	4	220.0
B	5	38,000	6	54,667	5	48,200	6	75,333	5	52,800	5	61,440	5	52,800	5	71.4
C	8	36,375	8	52,750	8	40,125	8	59,500	8	40,125	8	55,875	8	40,125	8	53.6
D	2	43,500	2	47,500	2	123,500	2	117,500	2	124,000	2	134,000	2	124,000	2	208.0
E	3	38,333	3	269,333	3	46,000	3	217,333	3	49,333	3	297,000	3	49,333	3	675.0
F	3	37,000	3	46,000	3	70,333	3	61.0	3	49,333	3	297,000	3	49,333	3	675.0
Total	27	38,667	23	90,522	27	66,333	25	110,120	26	69,500	26	109,818	22	69,500	22	191.4

TABLE I (Cont.)
Agars and Incubation Temperatures

Laboratory	Standard Agar at 37° C.			T-G-E-M Agar at 37° C.			T-G-E-M Agar at 32° C.			A.A.M.M.C. Agar at 37° C.			A.A.M.M.C. Agar at 32° C.		
	No.	Avg. Count	% Dev.	No.	Avg. Count	% Dev.	No.	Avg. Count	% Dev.	No.	Avg. Count	% Dev.	No.	Avg. Count	% Dev.
A B C D E F	2	69,000	58.7	2	101,500	47.1	2	155,000	125.0	2	83,500	21.0	2	129,500	87.0
	8	65,625	111.0	8	90,000	37.1	7	138,571	110.0	8	74,625	8.7	8	119,375	73.5
	6	76,333	63.4	6	113,000	48.0	6	155,000	103.0	6	117,667	54.1	6	166,667	118.3

	3	82,667	32.3	3	160,000	93.5	3	200,000	142.0	3	136,667	65.3	3	190,000	130.0
	2	60,000	..	2	68,000	13.3	..	..	..	2	41,000	-31.7	..	..	..
	21	70,905	77.7	21	104,620	47.5	18	156,111	115.3	21	93,429	29.7	19	141,263	99.7
Total	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
A B C D E F	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	3	126,667	23.0	3	116,667	-7.9	4	212,500	57.4	4	146,000	8.1	4	160,000	18.5
	6	158,333	4.0	6	215,000	27.7	6	241,667	43.5	6	220,000	30.7	6	236,667	40.6
	1	150,000	6.7	1	150,000	0.0	1	220,000	46.7	1	160,000	6.7	1	270,000	80.0

	1	150,000	..	1	360,000	140.0	..	..	..	1	320,000	113.3	..	..	..
	11	153,627	16.5	11	195,454	27.2	11	229,091	48.2	12	216,727	28.9	11	211,818	37.0
Total	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
A B C D E F	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	1	250,000	..	1	280,000	12.0	..	..	..	..	..	..	..	..	..
	1	290,000	-6.9	1	260,000	-10.3	1	280,000	-3.4	1	280,000	-3.4	1	300,000	3.4

	1	320,000	40.6	1	380,000	18.7	1	600,000	87.5	1	280,000	-12.5	1	340,000	6.7

	3	286,667	18.0	3	306,667	7.0	2	440,000	27.5	2	280,000	-8.2	2	320,000	4.9
Total	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Under* 5,000 5,100- 10,000 11,000- 25,000 26,000- 50,000 51,000- 100,000 110,000- 200,000 210,000- 500,000	49	3,152	8,054	49	7,153	127.0	36	11,068	267.8	46	5,320	69.1	36	8,733	193.0
	58	7,712	14,472	58	14,082	80.3	50	22,654	197.0	56	11,004	43.4	50	18,904	146.4
	24	16,667	29,522	24	31,583	89.5	24	49,208	196.7	26	20,938	25.1	23	38,565	131.6
	27	38,667	90,522	27	66,333	71.6	25	110,120	191.6	26	69,500	81.6	22	109,818	191.4
	21	70,905	129,550	21	104,620	47.5	18	156,111	115.3	21	93,429	29.7	19	141,263	99.7
	11	153,627	180,000	11	195,454	27.2	11	229,091	48.2	12	216,727	28.9	11	211,818	37.0
	3	286,667	360,000	3	306,667	7.0	2	440,000	27.5	2	280,000	-8.2	2	320,000	4.9
	193	31,527	54,737	193	46,649	48.0	166	70,133	113.7	189	42,934	35.8	163	63,292	90.8

Recapitulation, According to Count Magnitudes

Continued—page 832

TABLE I (Cont.)

Laboratory	Agars and Incubation Temperatures																
	Standard Agar at 37° C.			T-G-E-M Agar at 37° C.			T-G-E-M Agar at 32° C.			A.A.M.M.C. Agar at 37° C.			A.A.M.M.C. Agar at 32° C.				
	No.	Avg. Count	% Dev.	No.	Avg. Count	% Dev.	No.	Avg. Count	% Dev.	No.	Avg. Count	% Dev.	No.	Avg. Count	% Dev.		
	Recapitulation, By Laboratories																
A	11	37,336	10	80,700	119.5	11	93,818	151.3	12	129,667	263.8	12	85,000	138.5	10	100,000	181.9
B	37	41,781	41	71,312	81.4	37	50,038	19.8	38	76,755	101.1	37	45,800	12.7	37	69,286	73.0
C	56	41,182	53	52,972	23.4	56	51,486	25.0	54	66,878	57.4	55	53,400	27.8	55	65,449	56.5
D	19	17,028	19	24,553	44.2	19	27,737	62.9	19	37,711	121.4	19	27,353	60.6	18	38,432	129.0
E	43	22,126	43	48,409	118.8	43	36,874	66.7	43	66,081	198.7	43	27,600	24.7	43	56,351	145.7
F	27	20,259	..	....	....	27	41,633	105.5	..	....	....	23	33,052	60.6	..	....	....
Total	193	33,315	166	54,737	64.3	193	46,649	48.0	166	70,133	113.7	189	12,954	35.8	163	63,292	90.8

TABLE II

*Analysis of Plate Counts of Raw Milk
Made on
Three Agars, at Two Incubation Temperatures,
By
Magnitudes of Counts on Standard Agar, at 37° C.*

	Agars and Incubation Temperatures																	
	Standard Agar at 37° C.			Standard Agar at 32° C.			T-G-E-M Agar at 37° C.			T-G-E-M Agar at 32° C.			A.A.M.M.C. Agar at 37° C.			A.A.M.M.C. Agar at 32° C.		
	No.	Avg. Count	% Dev.	No.	Avg. Count	% Dev.	No.	Avg. Count	% Dev.	No.	Avg. Count	% Dev.	No.	Avg. Count	% Dev.	No.	Avg. Count	% Dev.
Under 5,000	9	3,300	6	6,450	+87.0	+3.7	9	3,422	+3.7	6	6,483	+88.0	9	3,900	+18.3	6	6,933	+101.0
5,100-10,000	5	7,620	2	13,000	+5.3	+17.1	5	8,920	+17.1	1	13,000	+83.0	5	8,620	+13.1	2	11,500	+3.5
11,000-25,000	2	12,500	2	22,000	+76.0	+20.0	2	15,000	+20.0	2	39,000	+21.2	2	9,750	-22.0	2	15,000	+20.0
26,000-50,000	2	35,500	2	71,000	+56.0	+18.3	2	42,000	+18.3	2	89,500	+96.6	2	53,000	+44.5	2	105,000	+131.0
51,000-100,000	5	85,200	5	119,200	+39.8	+23.7	5	105,400	+23.7	5	166,000	+94.7	5	132,000	+54.9	5	152,000	+78.4
110,000-200,000	6	148,333	6	177,500	+17.7	+7.7	6	159,833	+7.7	5	200,400	+45.7	6	190,000	+28.1	5	200,000	+42.8
210,000-500,000	3	250,000	3	306,667	+22.6	+5.3	3	263,333	+5.3	2	330,000	+22.2	3	273,333	+9.4	2	255,000	—
Over 1,000,000	1	2,100,000	1	2,300,000	+9.5	+16.1	1	2,800,000	+133.3	..	....	....	1	2,800,000	+33.3	1	3,000,000	+42.8
Total	33	131,206	27	190,063			33	159,558		23	121,778		34	166,962		25	222,984	

the right of the norm—percentage increase—is much more pronounced in Chart 3 than in Chart 1, and in only 6 cases was the deviation negative, representing a decreased count. The only variable in Charts 1 and 3 being the medium employed, it is obvious that T-G-E-M agar yields generally higher counts than standard agar. Chart 3 therefore corroborates Chart 2.

A.A.M.M.C. Agar at 37°C.—Chart 4 presents the extent of the deviation of individual counts of pasteurized milk on A.A.M.M.C. agar at 37°C., from counts of the same samples on standard agar at 37°C. One hundred and eighty-

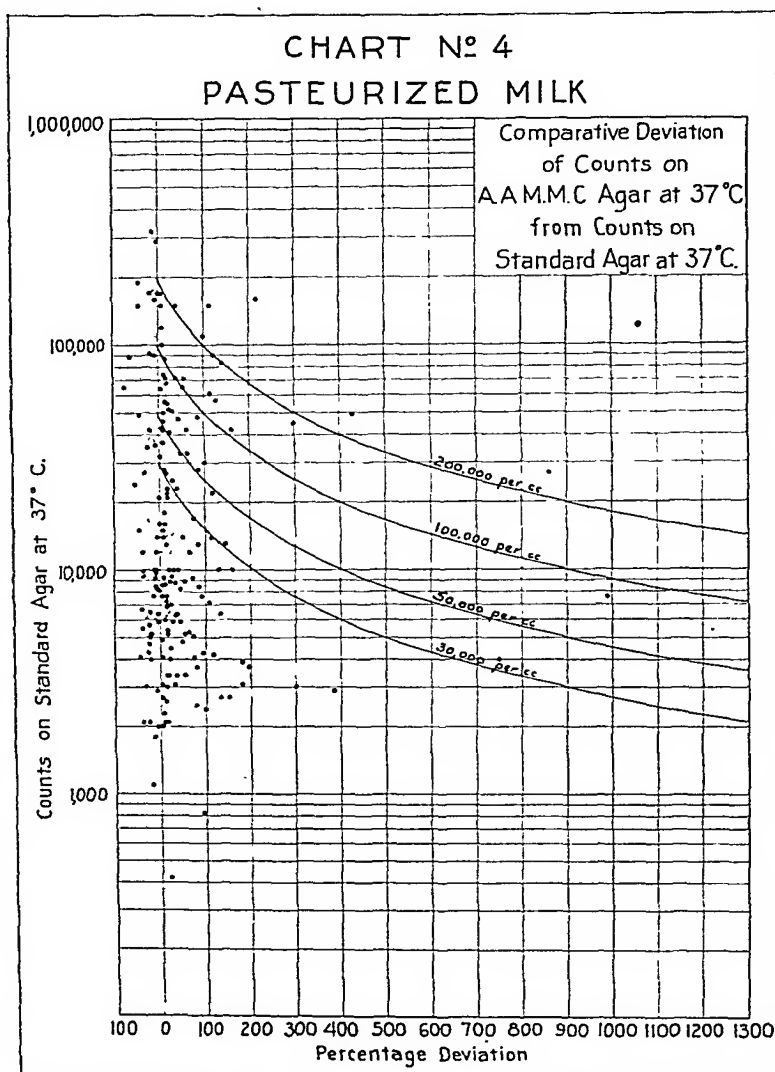
nine counts are located. The deviations range from minus 76.0 per cent (a decrease from 65,000 on standard agar at 37°C. to 16,000 on A.A.M.M.C. agar) to plus 991 per cent. The deviations, by ranges of magnitudes and direction, are shown in Tabulation E. The average deviation of all the 189 counts on A.A.M.M.C. agar at 37°C. from those on standard agar at 37°C. was 35.8 per cent upward. The average deviation in each range of magnitude and by laboratories is given in the recapitulations of Table I.

Comparison of Charts 2 and 4 emphasizes the greater concentration

CHART NO. 4—Deviation of Counts on A.A.M.M.C. Agar, at 37° C., from those on Standard Agar, at 37° C. 189 Counts. Average deviation: +35.8%.

Cumulative Deviations: Counts under 5,000 per cc., +69.1%; under 10,000 per cc., +49.9%; under 25,000 per cc., +39.2%; under 50,000 per cc., +60.3%; under 100,000 per cc., +47.1%; under 200,000 per cc., +40.8%; under 500,000 per cc., +35.8%.

Counts Exceeding Limit Because of Increase: 30,000 per cc., 7.4%; 50,000 per cc., 9.1%; 100,000 per cc., 5.7%; 200,000 per cc., 3.2%.



TABULATION E

INDIVIDUAL DEVIATIONS OF COUNTS OF PASTEURIZED MILK ON A.A.M.M.C. AGAR AT 37° C.

Range	Total	Increased	Per cent	Decreased	Per cent	Identical	Per cent
Under 5,000	46	33	71.8	13	28.2	0	0.0
5,100- 10,000	56	38	67.9	17	30.3	1	1.8
11,000- 23,000	26	18	69.2	6	23.1	2	7.7
26,000- 50,000	26	19	73.1	6	23.1	1	3.8
51,000-100,000	21	17	80.9	4	19.1	0	0.0
110,000-200,000	12	7	58.4	4	33.3	1	8.3
210,000-500,000	2	0	0.0	2	100.0	0	0.0
Total	189	132	69.8	52	27.6	5	2.6

of deviation points along the "norm" in Chart 4. The foregoing tabulation points to this result in that increase in the count occurred on A.A.M.M.C. agar in only 69.8 per cent of the cases, as

compared with increases in 82.4 per cent of the counts on T-G-E-M agar at 37°C.

A.A.M.M.C. Agar at 32°C.—Chart 5 presents the extent of the deviation of

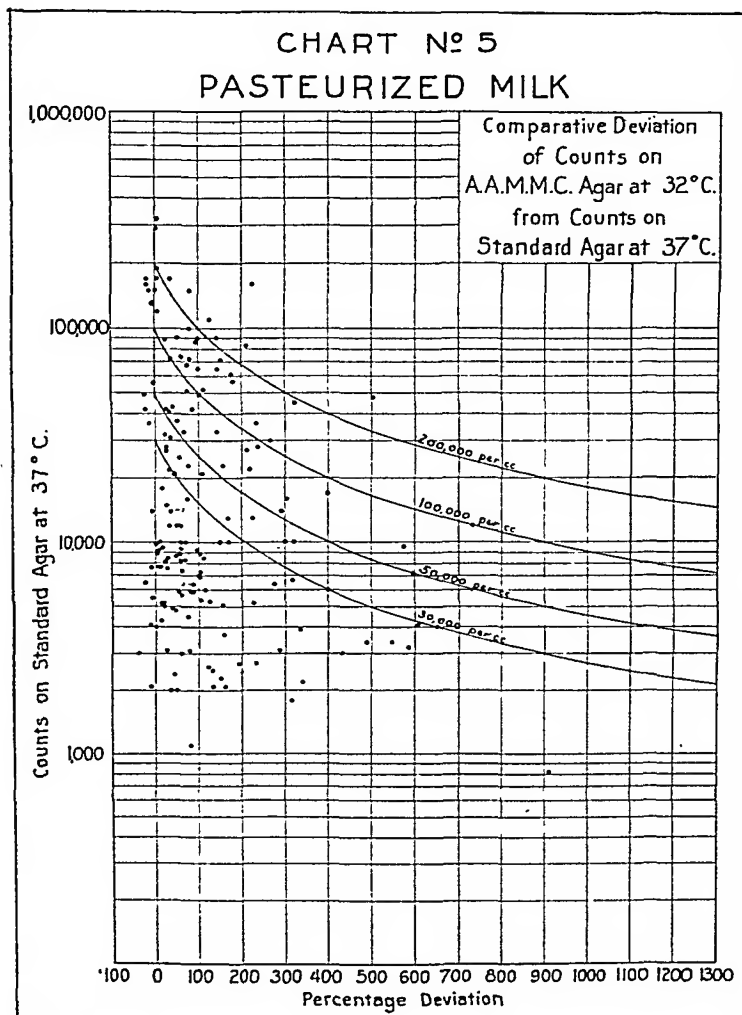


CHART No. 5—Deviation of counts on A.A.M.M.C. Agar, at 32° C., from those on Standard Agar, at 37° C. 163 Counts. Average deviation: +90.8%.

Cumulative Deviations: Counts under 5,000 per cc., +193.0%; under 10,000 per cc., +156.5%; under 25,000 per cc., +145.6%; under 50,000 per cc., +167.9%; under 100,000 per cc., +137.2%; under 200,000 per cc., +101.4%; under 500,000 per cc., +90.8%.

Counts Exceeding Limit Because of Increase: 30,000 per cc., 18.2%; 50,000 per cc., 16.8%; 100,000 per cc., 14.0%; 200,000 per cc., 4.3%.

TABULATION F

INDIVIDUAL DEVIATIONS OF COUNTS OF PASTEURIZED MILK ON A.A.M.M.C. AGAR AT 32° C.

Range	Total	Increased	Per cent	Decreased	Per cent	Identical	Per cent
Under 5,000	36	32	88.9	3	8.3	1	2.8
5,100- 10,000	50	46	92.0	4	8.0	0	0.0
11,000- 25,000	23	22	95.7	1	4.3	0	0.0
26,000- 50,000	22	19	86.4	3	13.6	0	0.0
51,000-100,000	19	18	94.7	1	5.3	0	0.0
110,000-200,000	11	7	63.6	3	27.3	1	9.1
210,000-500,000	2	2	100.0	0	0.0	0	0.0
Total	163	146	89.6	15	9.2	2	1.2

individual counts of pasteurized milk on A.A.M.M.C. agar, at 32°C., from the counts of the same samples on standard agar at 37°C. One hundred and sixty-three counts are located. The devia-

tions range from minus 40 per cent to plus 1,750 per cent (on a count of 8,200 on standard agar at 37°C., an increase to 150,000 on A.A.M.M.C. agar at 32°C.—not shown on this

CHART No. 6—Comparative Deviation of Counts on A.A. M.M.C. Agar from counts on T-G-E-M Agar, at 37° C., and at 32° C.
The percentages of deviation of the screened counts are indicated by the solid spots.

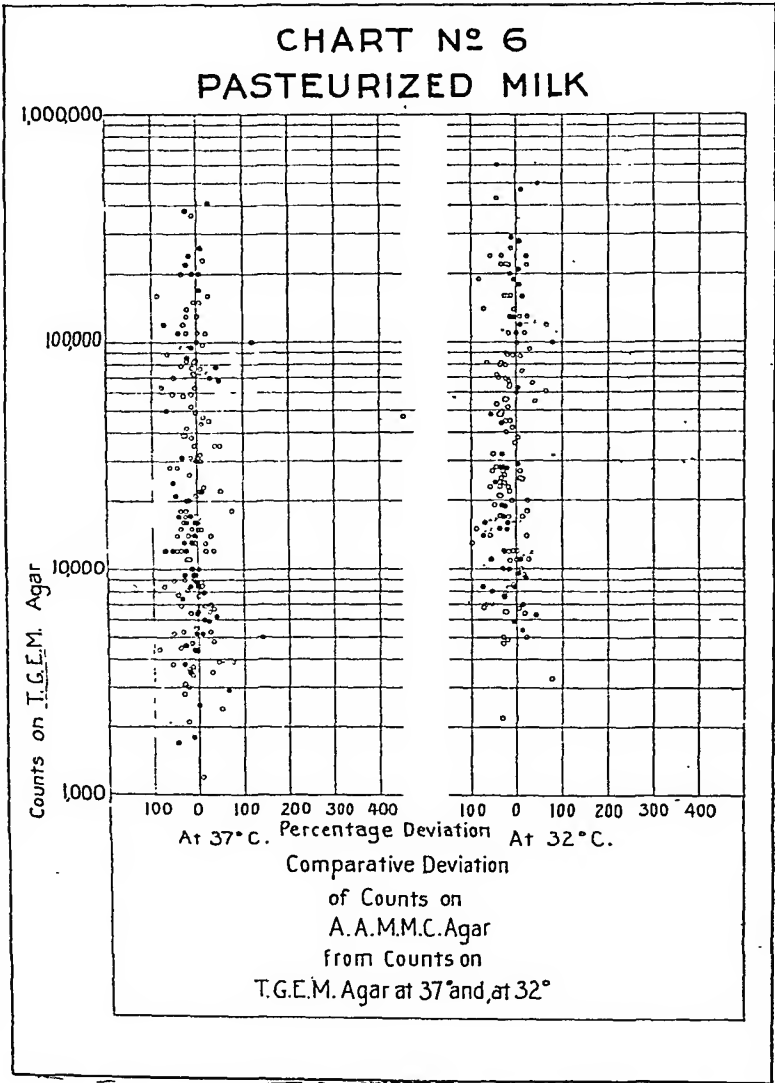


chart). The deviations are tabulated by ranges of magnitudes and direction as shown in Tabulation F.

The average deviation of all the 163 counts on A.A.M.M.C. agar at 32°C. from those on standard agar at 37°C. was 90.8 per cent upward. The average deviation in each range of magnitude and by laboratories, is given in the recapitulation of Table I. When compared with Charts 1 and 3, it is to be noted that the dispersion of points on Chart 5 is greater than that on Chart 1, but less than that on Chart 3.

The data from which Charts 1 to 5 were made are summarized in Table I.

Caution is advised in considering the average total counts and percentages of average deviation of the counts on the several media at the two temperatures for a slight deviation in one direction on a very high count may balance and nullify considerable deviation in the opposite direction on a number of lower counts. For this reason, the per-

centages of deviation of the average counts in the several ranges of count magnitude on standard agar at 37°C. are probably more significant than are the totals.

COMPARISON OF COUNTS ON T-G-E-M AND ON A.A.M.M.C. AGARS, AT 37°C. AND AT 32°C.

Since the primary purpose of the committee in conducting this study was to obtain data upon which to predicate a decision concerning an improvement in culture medium and a change in temperature of incubation, a more direct comparison of the two media under consideration than is possible by means of individual comparisons of each with standard agar appeared desirable. Such comparisons of counts on these two media at both 37°C. and 32°C., are presented in Chart 6.

In both instances the counts on T-G-E-M agar constituted the bases from which were computed the per-

TABULATION G

COMPARISONS OF T-G-E-M AND A.A.M.M.C. AGARS AT 37° C.

Range	No. of Counts	T-G-E-M Avg. Count	A.A.M.M.C. Avg. Count	Average Deviation
Under 5,000	29	3,498	3,517	+0.3 Per cent
5,100- 10,000	39	7,528	6,841	-9.1 " "
11,000- 25,000	44	15,841	13,445	-15.1 " "
26,000- 50,000	22	36,909	43,091	+16.7 " "
51,000-100,000	25	77,520	74,880	-3.4 " "
110,000-200,000	17	145,294	121,294	-19.7 " "
Over 200,000	7	300,000	288,571	-3.8 " "
Totals	183	45,969	42,417	-6.5 " "

COMPARISONS OF T-G-E-M AND A.A.M.M.C. AGARS AT 32° C.

Range	No. of Counts	T-G-E-M Avg. Count	A.A.M.M.C. Avg. Count	Average Deviation
Under 5,000	6	4,183	3,900	-6.8 Per cent
5,100- 10,000	24	7,792	6,575	-15.6 " "
11,000- 25,000	45	17,133	13,224	-22.8 " "
26,000- 50,000	22	36,136	26,591	-26.6 " "
51,000-100,000	27	72,851	68,778	-5.6 " "
110,000-200,000	20	144,500	131,700	-8.8 " "
Over 200,000	15	309,333	278,600	-9.9 " "
Totals	159	70,913	63,090	-10.1 " "

TABULATION H

RELATIONSHIP OF COUNTS ON A.A.M.M.C. AGAR TO COUNTS ON T-G-E-M AGAR

Incubation Temperature	No. of Counts	Increased		Decreased		Identical	
		No.	Per cent	No.	Per cent	No.	Per cent
37° C.	183	56	30.6	119	65.0	8	4.4
32° C.	159	47	29.6	108	67.9	4	3.5

centage deviations of the counts of the same samples on A.A.M.M.C. agar.

Comparisons of Chart 2 with 4, and of Chart 3 with 5 indicate that the dispersion of counts from the norm, or the increase in count is greater on T-G-E-M agar than on A.A.M.M.C. agar. The recapitulations of Table I confirm this. It is to be expected, therefore, that when the magnitudes of counts on A.A.M.M.C. agar are compared with those of the same samples on T-G-E-M agar, a negative deviation will be noted.

The average deviation by count magnitudes was by no means uniform, either in percentage or in direction. This is confirmed by Tabulation G.

It is to be noted that, except in two ranges of magnitudes of counts on T-G-E-M agar, at 37°C., the average deviation of the counts on A.A.M.M.C. agar was always negative; that is, the T-G-E-M agar counts were, on the whole, the higher.

In terms of numbers of individual counts, the relationships of A.A.M.M.C. agar counts to those on T-G-E-M agar, at the two temperatures, were as shown in Tabulation H.

It is quite clear, then, that regardless of the manner in which the relationship

is determined, counts on T-G-E-M agar were, on the whole, higher than those on A.A.M.M.C. agar.

(The difference in designation of points on Chart 6 is explained in Part II).

RAW MILK COUNTS ON THE SEVERAL MEDIA, AND AT THE TWO TEMPERATURES OF INCUBATION

The number of reports of results of the platings of raw milk was so small (34 was the maximum number on which comparisons were possible) that a scatter diagram would be rather valueless. However, summaries of the data on this type of sample, similar to those given in one of the recapitulations of Table I, are given in Table II.

A comparison of Table II with the parallel portion of Table I reveals the fact that the average deviations of the counts of raw milk are consistently lower than those of pasteurized milk. In only 5 of the 35 parallel ranges and culture conditions is the average deviation greater in the case of raw milk than in the case of pasteurized milk.

However, no conclusions may be drawn from the average behavior of groups of 6 or less samples, even though they be in the same general magnitude

TABULATION I

COMPARISON OF AVERAGE PERCENTAGE DEVIATIONS

	Stand. Agar—32° C.		T-G-E-M Agar—37° C.		T-G-E-M Agar—32° C.		A.A.M.M.C. Agar—37° C.		A.A.M.M.C. Agar—32° C.	
	Avg. Count	Per cent Dev.	Avg. Count	Per cent Dev.	Avg. Count	Per cent Dev.	Avg. Count	Per cent Dev.	Avg. Count	Per cent Dev.
Past.	54,737	+64.3	46,649	+48.0	70,133	+113.7	42,954	+35.8	63,292	+90.8
Raw	190,363	+16.1	159,558	+21.6	121,778	+ 54.8	166,962	+24.2	222,984	+15.2

range. The average deviations for the whole groups of pasteurized milk and raw milk counts are somewhat more significant, and bear a rather striking comparison to one another, as Tabulation I shows.

As previous investigators who have examined larger numbers of samples with T-G-E-M agar have reported similar findings, a possible and probable explanation of the lower average percentage of deviation in the case of raw milk is that the bacterial flora of raw milk grows better on the present standard agar than does the flora of pasteurized milk.

PASTEURIZED CREAM COUNTS ON THE SEVERAL MEDIA AND AT THE TWO TEMPERATURES

Seventeen of the 23 pasteurized cream counts reported were usable, but this number was too small to be segregated into groups, according to magnitudes, from the findings of which conclusions might be drawn. Because, however, of the striking divergence of some of the figures for pasteurized cream from the parallel figures for pasteurized milk (Table I) and raw

milk (Table II), summaries and computations applying to the whole set of reports on this product are presented in Tabulation J.

It is worthy of note that the effect of 32°C. incubation was greater than the effect of the use of either of the improved agars. This is in line with previous findings that have indicated the presence of a low temperature flora in pasteurized cream and ice cream mixes whose presence is not indicated in any way when incubation is at 37°C.

ACTION OF THE COMMITTEE

The foregoing presentation of data constitutes an amplification of the preliminary report²¹ placed before the Committee on Standard Methods for the Examination of Dairy and Food Products on October 25, 1938.

Because of the more universal increase of the plate count on T-G-E-M agar than on the A.A.M.M.C. agar, both from the standpoint of frequency and extent of increase, the Tryptone-glucose-extract-skim milk (T-G-E-M) agar was selected as the standard agar. It was recommended that it be put into use, from and after July 1, 1939.²²

TABULATION J

COMPARISONS OF RAW AND PASTEURIZED MILK AND PASTEURIZED CREAM COUNTS

		Milk Raw	Milk Pasteurized	Cream Pasteurized
Standard	No. of Counts	27	166	15
Agar	Average Count	190,063	54,737	169,520
at 32° C.	Average Deviation	+16.1%	+64.3%	+228.6%
T-G-E-M	No. of Counts	33	193	17
Agar	Average Count	159,558	46,649	126,918
at 37° C.	Average Deviation	+21.6%	+48.0%	+50.6%
T-G-E-M	No. of Counts	23	166	15
Agar	Average Count	121,778	70,136	187,620
at 32° C.	Average Deviation	+54.8%	+113.7%	+263.6%
A.A.M.M.C.	No. of Counts	34	189	17
Agar	Average Count	166,962	42,954	101,576
at 37° C.	Average Deviation	+24.2%	+35.8%	+20.4%
A.A.M.M.C.	No. of Counts	25	163	14
Agar	Average Count	222,984	63,292	201,228
at 32° C.	Average Deviation	+15.2%	+90.8%	+366.5%

This action of the committee was supported by the Coördinating Committee on Standard Methods of the Laboratory, and Food and Nutrition Sections, and by the Committee on Research and Standards, and the Governing Council of the Association.

The much greater increase in counts from incubation at 32°C., indicating that serious difficulty might be met in enforcing existing plate count limits and standards; the prospect that many public health laboratories could not be equipped with 32°C. incubators within a relatively short interval; and the difficulties of maintaining the incubator temperature at 32°C. (89.4°F.) while atmospheric temperatures sometimes exceed 38°C. (100°F.)—these practical considerations led the committee to retain 37°C. as the standard temperature of incubation. But, in order to emphasize the need for the correction of erroneous technics, the committee specified that the incubation temperature tolerance shall be in a negative direction only, and shall lie between 35°C. and 37°C.²²

PART II

The substitution of T-G-E-M agar for standard agar and the retention of 37°C. as the temperature of incubation having been accepted by the Association, an analysis of the data secured in the study made by the committee, for the purpose of ascertaining, if possible, the extent to which milk and dairy products plate counts may be expected to be increased by the use of the T-G-E-M agar, seems pertinent and apropos.

Before undertaking such an analysis—or, at least, before any credence is to be placed in the conclusions drawn from such an analysis—it must be assumed that the counts reported were essentially correct; and, it must also be recognized that the deductions and conclusions drawn from the analyses of

these counts may be applied only to groups of counts which are also essentially correct.

ANALYSES OF FINDINGS

The effect upon milk and cream plate counts of the change to T-G-E-M agar is of interest to milk producers, milk pasteurizers, and milk quality control authorities, particularly in areas in which the average bacterial plate count is a factor in the determination of grade, or of the premium paid for milk on the basis of the count.

The limit of deviation in an upward direction (percentage increase) permissible for a count at any given magnitude on standard agar at 37°C. to remain within certain numerical limits under other conditions of culture, is given for 4 frequently applied bacterial plate count limits, on each of Charts 1, 2, 3, 4, and 5. Counts which have fallen beyond the limits fixed are those the points of which are located in the area below the ordinate for the limiting count (30,000, 50,000, 100,000, or 200,000 per cc.) and to the right and above the curve for this limiting count.

In the following tabulations only those upper limits are used which occur in the U. S. Public Health Service Milk Ordinance.

The numbers and percentages of instances in which use of the T-G-E-M agar at 37°C. increased the standard agar counts at 37°C., beyond the limits for certain grades of milk and cream, are given in Tabulation K.

The percentages in the foregoing tabulations, it must be observed, apply only to the chance arrangements of magnitudes composing the groups on which these percentages were computed. For instance, in the case of pasteurized milk, with a limiting count of 30,000 per cc., less than 5 per cent of the counts were in the upper sixth of the range 0–30,000; but the per-

TABULATION K

PASTEURIZED MILK—UPPER LIMIT 30,000 PER CC.

Range on Standard Agar	No. of Counts	Counts Over Limit (30,000) on T-G-E-M Agar	
		No.	Per cent
Under 5,000	49	1	2.0
5,100-10,000	58	3	5.2
11,000-25,000	24	7	29.2
26,000-30,000	6	5	83.3
Totals	137	16	11.7

(Two of 25 counts in the range 31,000 to 50,000, inclusive, were decreased below the limit of 30,000 on T-G-E-M agar.)

PASTEURIZED MILK—UPPER LIMIT 50,000 PER CC.

Range on Standard Agar	No. of Counts	Counts Over Limit (50,000) on T-G-E-M Agar	
		No.	Per cent
Under 5,000	49	1	2.0
5,100-10,000	58	2	3.4
11,000-25,000	24	2	8.3
26,000-50,000	27	14	51.8
Totals	158	19	12.0

(One of the 20 counts in the range 51,000 to 100,000, inclusive, was decreased below the limit of 50,000 per cc. on T-G-E-M agar.) See Chart No. 2.

RAW MILK—UPPER LIMIT 50,000 PER CC.

Range on Standard Agar	No. of Counts	Counts Over Limit (50,000) on T-G-E-M Agar	
		No.	Per cent
Under 5,000	9	2	22.2
5,100-10,000	5	0	0.0
11,000-25,000	2	0	0.0
26,000-50,000	2	1	50.0
Totals	18	3	16.7

RAW MILK—UPPER LIMIT 200,000 PER CC.

Range on Standard Agar	No. of Counts	Counts Over Limit (200,000) on T-G-E-M Agar	
		No.	Per cent
Under 5,000	9	2	22.2
5,100-10,000	5	0	0.0
11,000-25,000	2	0	0.0
26,000-50,000	2	1	50.0
51,000-100,000	5	1	20.0
110,000-200,000	6	1	16.7
Totals	29	5	17.2

TABULATION K (Cont.)

PASTEURIZED CREAM—UPPER LIMIT 60,000 PER CC.

Range on Standard Agar	No. of Counts	Counts Over Limit (60,000) on T-G-E-M Agar	
		No.	Per cent
Under 5,000	3	0	0.0
5,100-10,000	3	0	0.0
11,000-25,000	1	0	0.0
26,000-50,000	4	1	25.0
51,000-60,000	0	0	0.0
Totals	11	1	9.1

PASTEURIZED CREAM—UPPER LIMIT 100,000 PER CC.

Range on Standard Agar	No. of Counts	Counts Over Limit (100,000) on T-G-E-M Agar	
		No.	Per cent
Under 5,000	3	0	0.0
5,000- 10,000	3	0	0.0
11,000- 25,000	1	0	0.0
26,000- 50,000	4	0	0.0
51,000-100,000	2	1	50.0
Totals	13	1	7.7

centage of counts over 30,000 per cc. on T-G-E-M agar, in this sixth of the range, was 83.3 per cent.

It would be advantageous in any revision of bacterial plate count limits for grades of milk that may be necessary, if the increase in counts resulting from the use of the T-G-E-M agar might be estimated or prognosticated with a fair degree of accuracy. It appears, however, from a study of Tables I and II, that average deviations (increases) of 48.0 per cent and 21.6 per cent, respectively, resulting from plating of pasteurized milk and raw milk, respectively, on T-G-E-M agar, are by no means uniform throughout all ranges of magnitudes of counts on standard agar. In the case of pasteurized milk (Table I) there is almost a uniform decrease in the percentage deviation—all upward—between the ranges 0-5,000 and 210,000-500,000 per cc., the percentages being: 127.0, 80.3, 89.5, 71.6,

47.5, 27.2, and 7.0. Only the average deviation for the 21 counts in the range 51,000-100,000—47.5 per cent—approaches closely the average deviation for the whole group of 193 counts. In the case of raw milk the phenomenon of higher percentage deviations in the lower ranges of counts is not encountered, although the sub-groups in this group of 33 counts (Table II) are really too small to serve as representative samples. This is also true of the percentage deviations of pasteurized cream counts.

Nor is there a high degree of agreement in the percentage average increases (deviation) of counts on T-G-E-M agar (or, incidentally, on either medium at either temperature) on the part of the laboratories participating in the study (Recapitulation by Laboratories of Table I).

It appears, then, not to be possible or advisable to assume that a sample

of milk or cream yielding a count on standard agar within a certain magnitude range, would have yielded a count a certain definite percentage higher had it been plated on T-G-E-M agar; nor, conversely, that a count within a given range on T-G-E-M agar would have been a fixed percentage lower had it been plated on standard agar.

In order to check the effect of the method of determination and selection of count results upon the percentages of deviation in count, a more rigid set of criteria for closeness of correspondence between the computed counts of the two dilutions, and also between the calculated counts of the two sets of plates, was fixed. This resulted in the screening out of 55 to 63 per cent of the counts considered in the foregoing portion of this study. The same methods of analysis were applied to the smaller numbers of screened counts, with not significantly divergent results. It may reasonably be assumed, therefore, that other groups of counts determined with a degree of care comparable with those selected for this study, and of approximately the same proportionate magnitudes, would be similarly affected by the conditions of culture studied.

In Chart 6 the percentages of deviation of the screened counts are indicated by the solid spots, whereas those of the unscreened counts (other than those which appear among the screened counts) appear as open circles.

COMPARISONS OF THE FINDINGS OF THIS STUDY WITH THOSE OF OTHER STUDIES

It is quite possible that, because of major differences in the magnitudes of the standard agar at 37°C. counts of the milks examined in these several studies, the findings with respect to the effect of T-G-E-M agar at 37°C. of, for instance, Kelly,¹⁶ Bradfield,²⁰ and of this study are not closely comparable.

Nevertheless, a presentation of such of the results or findings of these three reports as are of the same general nature, may be of interest.

Kelly reports that the average count of 1,051 samples of Grade A pasteurized milk was increased 46 per cent, and that of 859 samples of Grade B pasteurized milk was increased 52 per cent, when plated on T-G-E-M agar at 37°C. Bradfield obtained an increase of 104 per cent in the average count of 71 samples of pasteurized milk. (The figure 274 per cent given in Table 20 of Bradfield's report is an arithmetic average of the 71 percentages of increase or decrease in count.) The average increase in the count of 193 samples of pasteurized milk reported for this study was 48 per cent (Table I). In the case of 86 screened reports of pasteurized milk, the counts increased 54 per cent on T-G-E-M agar at 37°C.

In the case of raw milk, Kelly reports a decrease of 7 per cent in the average count of 1,157 samples plated on T-G-E-M agar at 37°C. Bradfield obtained an increase 27.1 per cent in the average count of 159 samples (Table 1 of that report). In this study an increase of 21.6 per cent was obtained in the average count of 33 samples (Table II).

As stated heretofore, these percentages of deviation (increase or decrease) in the average counts of all the pasteurized milk or of all the raw milk samples examined are not really significant. A slight change in the ratio of high to low count samples in these groups would undoubtedly have altered these percentages. This is quite clearly demonstrated when the percentage increases in average count are calculated for the progressively larger groups of counts obtained by adding cumulatively the numbers of counts in the respective ranges of magnitudes, as given in Tabulation L.

TABULATION L
CUMULATIVE PERCENTAGES OF COUNT DEVIATION PASTEURIZED MILK

Range on Standard Agar	Bradfield T-G-M Agar		Present Study T-G-E-M Agar	
	No.	Per cent Dev.	No.	Per cent Dev.
Under 5,000	19	+596.8	49	+127.0
Under 10,000	31	+537.1	107	+ 93.9
Under 25,000	48	+205.5	131	+ 92.2
Under 50,000	62	+131.8	158	+ 81.7
Under 100,000	67	+140.0	179	+ 67.8
Under 200,000	69	+128.4	190	+ 54.7
Under 500,000	71	+103.7	193	+ 48.0

The striking fact emphasized by this tabulation is the effect upon the percentages of increase in average count produced by the relatively smaller deviations in the counts in the higher ranges of magnitude.

In order to obtain a conception of the degree of similarity or coincidence of results obtained by the three studies heretofore referred to by eliminating or segregating the effect of the counts in the higher ranges, a comparison of

TABULATION M
COMPARISON OF FINDINGS OF THREE STUDIES
INDIVIDUAL DEVIATIONS OF COUNTS OF PASTEURIZED MILK ON
T-G-M AND T-G-E-M AGAR AT 37° C.

Study	Total	Increased	Per cent	Decreased	Per cent	Identical	Per cent
Counts under 10,000 on Standard Agar							
Kelly—Grade A	963	687	71.3	276	28.7	..	...
Kelly—Grade B	661	514	77.7	147	22.3	..	...
Bradfield	31	29	93.4	1	3.3	1	3.3
Present study	107	94	87.8	13	12.2	0	0.0
Total	1,762	1,324	75.1	437	24.8	1	0.01
Counts from 11,000 to 25,000 Inclusive on Standard Agar							
Kelly—Grade A	74	46	62.1	28	37.9	..	...
Kelly—Grade B	148	92	62.1	56	37.9	..	...
Bradfield	17	15	88.2	2	11.8	0	0.0
Present study	24	18	75.0	2	8.3	4	16.7
Total	263	171	65.0	88	33.5	4	1.5
Counts from 26,000 to 100,000 Inclusive on Standard Agar							
Kelly—Grade A	21	10	47.6	11	52.4	..	...
Kelly—Grade B	45	28	62.2	17	37.8	..	...
Bradfield	19	14	73.7	5	26.3	0	0.0
Present study	48	39	81.2	9	18.8	0	0.0
Total	133	91	68.4	42	31.6	0	0.0
Counts Over 100,000 on Standard Agar							
Kelly—Grade A	2	0	0.0	2	100.0	..	...
Kelly—Grade B	5	1	20.0	4	80.0	..	...
Bradfield	4	3	75.0	0	0.0	1	25.0
Present study	14	8	57.2	5	37.5	1	7.1
Total	25	12	48.0	11	44.0	2	8.0

the numbers and percentages of the counts which were increased or decreased by plating on T-G-M agar and T-G-E-M agar at 37°C. has been made. See Tabulation M.

The groupings of count magnitude in this tabulation depart somewhat from those generally followed in this report, but were necessitated by the groupings in the report of Kelly. It is interesting to note that these groupings indicate that the T-G-E-M agar caused increases in counts even more regularly than the T-G-M agar.

SUMMARY

The results of a total of 335 milk (certified, raw, pasteurized, and certified-pasteurized) and cream (certified, and pasteurized) samples, plated on standard agar, Tryptone-glucose-extract-agar, and the American Association of Medical Commissions agar, and incubated at 32°C. and 37°C., by 7 laboratories, were analyzed.

Pasteurized Milk

An increase in count was observed in 70 per cent or more of the samples when plated on either T-G-E-M or A.A.M.M.C. agar, at 37°C., the average increases in count being, respectively, 48.0 and 35.8 per cent.

An increase in count was observed in 88 per cent of the samples when plated on standard agar at 32°C., the average increase being 64.3 per cent.

A cumulative increase in count was noted when samples were plated on either T-G-E-M or A.A.M.M.C. agar, at 32°C., the increases being, respectively, 113.7 and 90.8 per cent.

The T-G-E-M agar yielded generally higher counts than the A.A.M.M.C. agar, at both temperatures of incubation.

Raw Milk

The comparatively small number of results available for analysis places a

questionable value upon the analytical findings. However, the two modified media yielded increases in individual and average counts, but the cumulative effect of incubation at 32°C. was noted only in the case of T-G-E-M agar; the average increase in count was lower in the case of A.A.M.M.C. agar at 32°C. than at 37°C.

The analysis of the results on this small group of samples appears to corroborate the findings of other investigators that increases in counts on the modified agars are not so large in samples of low-count raw milk as in samples of low-count pasteurized milk.

Pasteurized Cream

Increases in average counts on T-G-E-M and A.A.M.M.C. agars at 37°C. paralleled or were not greatly divergent from those of raw and pasteurized milk at this temperature. But the percentages of increase in count on the three media, at 32°C., were two- to four-fold those in the case of pasteurized milk, and five- to twenty-four fold those of raw milk.

Although the counts of pasteurized cream were few in number, the findings were similar to those obtained in previous studies, in that there was distinct indication of the presence in these cream samples of bacteria which grow well at 32°C., even on standard agar, but do not develop at 37°C., even on the improved agars.

The use of T-G-E-M agar, selected as the standard after July 1, 1939, may be expected to increase beyond the legal limits such counts as on standard agar were, or would have been, close to the legal limit. This, however, will affect only milk supplies the counts of which, on standard agar, have not presented a true picture of bacterial content.

The findings of this study do not deviate significantly from those of previous investigators.

CONCLUSIONS

1. Because of the relatively small numbers of plate counts of raw milk and cream, and of pasteurized cream considered in this study, conclusions may be drawn with confidence only from the analyses of the data on pasteurized milk. The use of tryptone-glucose-extract-skim milk (T-G-E-M) agar at an incubation temperature of 37°C. resulted, in 60 to 90 per cent of the cases—varying inversely with the magnitude of the count—in an increase over the plate count on standard nutrient agar.

2. The percentage of such increase in count was extremely variable, although the percentage of average increase was greater in the lower than in the higher ranges of counts on standard nutrient agar.

3. In general, higher counts resulted from the use of T-G-E-M agar than from the use of the American Association of Medical Milk Commissions (A.A.M.M.C.) agar at incubation temperatures of 32°C. and 37°C., although the difference in average counts did not exceed 10 per cent.

4. The results of this study parallel those of other studies conducted, and corroborate the conclusions drawn therefrom.

5. There is no indication of a fixed ratio between counts on standard nutrient agar and those obtained by the use of either of the other media.

6. It follows that attempts to correlate or translate counts on T-G-E-M or A.A.M.M.C. agar to what they would have been had standard nutrient agar been used, or vice versa, are likely to be misleading.

7. Incubation at 32°C. in combination with the use of the modified agars, resulted in increases in plate count of considerably greater magnitude than were obtained by the use of these agars and incubation at 37°C.

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REFERENCES

1. Conn, H. W. Standards for Determining the Purity of Milk. *Reprint 295, Pub. Health Rep.*, Aug. 13, 1915.
2. Hatfield, Hazel M. A Comparative Study of Milk Plates by Four New York Laboratories—A Preliminary Report. *A.J.P.H.*, 8:913-915, 1918.
3. Kilbourne, Charles H. Varying Bacteriological Results Obtained by Different Laboratories. *Creamery & Milk Plant Month.*, 7, Nos. 10 and 11, 1918.
4. Bowers, C. S., and Hucker, G. J. Studies with Standard Agar as Employed in Milk Control Work. *A.J.P.H.*, 24, 4:396 (Apr.), 1934.
5. Bowers, C. S., and Hucker, G. J. The Composition of Media for the Bacteriological Analysis of Milk. *Tech. Bull.* 228. New York State Agri. Exper. Sta., Mar., 1935.
6. Breed, R. S. Media Suggested as Substitutes for the Standard and Nutrient Agar Used in Routine Milk Work. *A.J.P.H.*, 25:663 (Mar.), 1935.
7. Supplee, G. C., Whiting, W. A., and Downs, P. A. Variations in Bacteria Counts from Milk as Affected by Media and Incubation Temperature. *Cornell Univ. Agri. Exper. Sta. Mem.* 43, 1921.
8. Ward, A. R., and Harding, H. A. Variation in Temperatures Within Bacteriological Incubators. *J. Bact.*, 11:91, 1926.
9. Mickle, F. L. Brief Notes on Laboratory Incubator Temperature. *19th Annual Rep. Intern. Assn. Dairy & Milk Inspectors*, 1930, pp. 288-300.
10. Breed, R. S., and Pederson, C. S. How Variations in Incubator Temperatures Affect the Accuracy of Bacterial Counts. *24th Annual Proc. Lab. Sect., Intern. Assn. Milk Dealers*, 1931, pp. 68-87.
11. Breed, R. S., and Pederson, C. S. The Effect of Variations in Temperatures in 37°C. Incubators

on Bacterial Counts from Milk. *A.J.P.H.*, 22, 7:745 (July), 1932.

12. Yale, M. W., Pederson, C. S., and Breed, R. S. Bacteriological Incubators. *25th Annual Proc. Lab. Sect., Intern. Assn. Milk Dealers*, 1932, pp. 127-134.

13. Yale, M. W., Pederson, C. S., and Breed, R. S. Temperature Uniformity in Bacteriological Incubators. *J. Bact.*, 25:66, 1933.

14. Pederson, C. S., Yale, M. W., and Eglinton, R. Temperature Variations in Bacteriological Incubators. *Tech. Bull. 213*, New York State Agri. Exper. Sta., 1933.

15. Pederson, C. S., and Yale, M. W. Effect of Temperature of Incubation Upon Agar Plate Count of Milk. *A.J.P.H.*, 24, 5:477 (May), 1934.

16. Kelly, Ernest. Report of Collaborator on Coöperative Work with Proposed Changes in Medium and Temperature of Incubation. *29th Annual Proc. Lab. Sect., Intern. Assn. Milk Dealers*, 1936, pp. 50-75.

17. Cone, J. F. Comments on Possible Influence of Variations in Laboratory Technique. *29th Annual Proc., Lab. Sect., Intern. Assn. Milk Dealers*, 1936, pp. 75-81.

18. Robertson, A. H. The New Proposed Procedure for Making Ice Cream Plate Counts. *36th Annual Proc. Prod. and Lab. Council, Intern. Assn. Ice Cream Mfgs.*, 1936, pp. 132-144.

19. Bradfield, Alec. Bacterial Content of Milk, as Affected by the Use of Different Plating Methods. *Vermont Agri. Exper. Sta. Bull. 417*, 1937.

20. Brown, J. Howard, Bonyng, C. W., and Moak, Harris. Results Obtained in a Coöperative Investigation of Bacteriological Media for Milk Counts. *Am. J. Hyg.*, 27:12-18, 1938.

21. Yale, M. W. Standard Agar Counts as Compared with Counts on Improved Agars at 32° C. *A.J.P.H.*, 2, 28:148 (Feb.), 1938.

22. Abele, C. A. Comparative Tests of Agar Media for Standard Milk Work. *A.P.H.A. Yearbook*, 1938-39, p. 79.

The Care of Premature Infants*

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THE fate of the premature infant depends on a number of factors, among which are the health of the mother during pregnancy, the degree of the infant's immaturity at birth, and the care that is received by the infant after birth.

Methods of caring for premature infants have been determined largely on a trial-and-error basis rather than on a scientific one. The lack of adequate study and evaluation of such methods from the clinical and the experimental points of view has been due largely to the lack of realization of the magnitude of the problem and of the results that may be expected when increased efforts are made to reduce the mortality among premature infants.

It is true, of course, that infants weighing at birth less than 1,000 gm. (2.2 lb.) rarely survive. Since weight in itself is not an exact measure of maturity, this criterion should not be used alone to judge viability. Some obstetricians state that an infant weighing less than 1,500 gm. is "previsible." There are, however, a large enough number of records of the survival of infants weighing at birth less than 1,500 gm., and even less than 1,000, to warrant efforts to save such infants,

regardless of the size or maturity of the individual infant. Hoffman¹ and his coworkers have reported the case of a premature infant that lived, although it weighed at birth only 735 gm. (1.6 lb.). In Figure I this infant is shown at 23 days, and in Figure II, at 35 days. Figure III shows the initial loss in weight and the gain up to the age of 100 days. Figure IV shows the infant at 1 year, weighing 17 lb., 5 oz.†

Statements are found in the literature that when these small infants survive, a large proportion of them, even if they develop physically, show more or less mental retardation. These statements, however, have not as a rule been based on acceptable psychological tests, nor have satisfactory controls been used. That premature infants develop normally—both physically and mentally—as do full-term infants has now been well established through the work of Hess, Mohr, and Bartelme,² and of Gesell³ in the United States, as well as by that of von Sydow⁴ and Melcher⁵ in Europe, and a number of other investigators. For example, Hess, Mohr, and Bartelme² state: "... our comparisons of two groups of prematurely born children ... with full-term children ... indicate that premature birth unassociated with intracranial injury

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*Courtesy of Samuel J. Hoffman, M.D., et al.,
and the J.A.M.A.*

FIGURE I—Premature infant 23 days old.
Birth weight, 735 gm.

does not affect mental development.” The conclusions of these specialists in the field of pediatrics and psychology have been well expressed by Gesell³ as follows: “Present data, though scanty and sometimes contradictory, indicate that prematurity of birth in itself does not markedly distort, hasten, or retard the course of mental development when the age of the infant is reckoned from conception.”

How many babies are born prematurely each year? As premature birth is not reportable throughout the United States Birth Registration Area, and as data in this regard are not compiled by the Bureau of the Census, the answer to this question is not known except on the basis of special studies. The Children's Bureau,⁶ in a study of nearly 23,000 live births occurring in 8 cities, found that 5 per cent were premature. A recent report by the Metro-

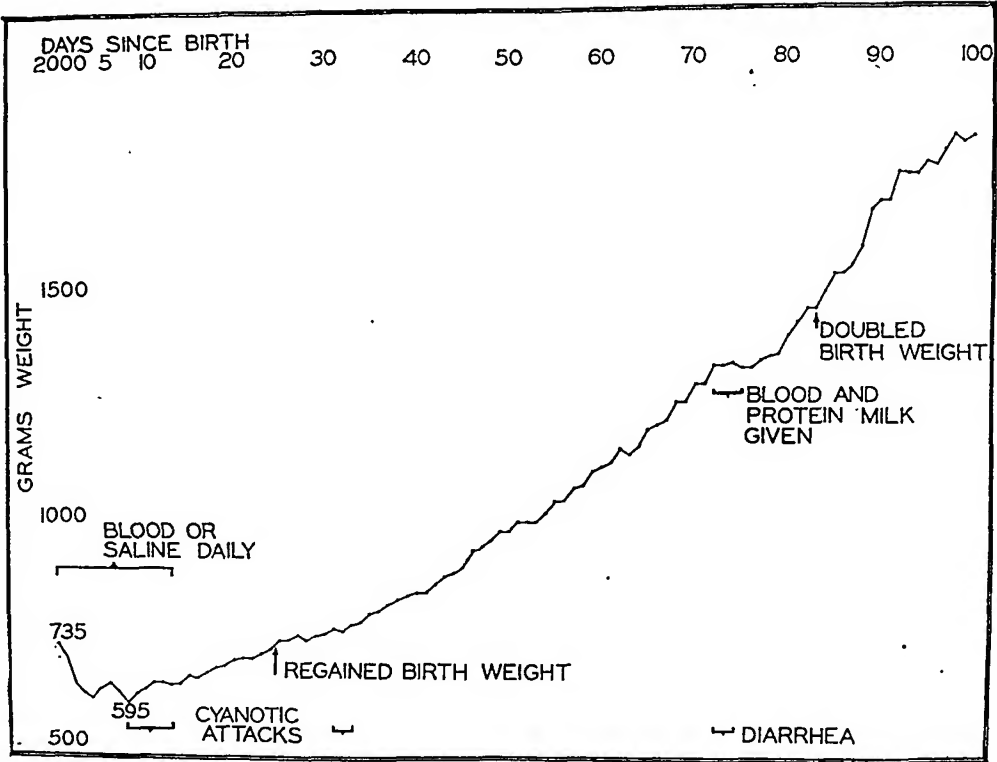
politan Life Insurance Company⁷ of a survey made in 13 leading hospitals in the United States showed that slightly more than 5 per cent of the 141,098 live births that occurred in these hospitals during the period 1933–1936 were premature. In New York State, exclusive of New York City, more than 4 per cent of the 82,000 infants born alive in 1936 were reported to be premature.⁸ In Chicago slightly more than 4 per cent of the 97,000 infants born alive in 1936 and 1937 were reported to be premature.⁹

There were in the United States 2,144,790 live births in 1936.¹⁰ If an estimate is made that 4 per cent of these live births were premature, more than 85,000 infants were born prematurely in that year. Such an estimate obviously does not take into account geographic or racial variations or the social and economic factors that have



*Courtesy of Samuel J. Hoffman, M.D., et al.,
and the J.A.M.A.*

FIGURE II—Same infant 35 days old.



Courtesy of Samuel J. Hoffman, M.D., et al., and the J.A.M.A.

FIGURE III—Initial loss and gain in weight.

been shown to influence the incidence of premature birth, but it is believed that this 85,000 is an underestimate rather than an overestimate of the number of infants born prematurely in the United States each year.

The mortality rates among premature infants under 1 month of age are high—between 15 and 16 deaths per 1,000 live births (in the period 1933–1936). In Figure V, which shows the causes of mortality in the first month of life, it can be seen that 81 per cent of the deaths are due to prenatal and natal causes. Almost half, 46 per cent, are due to premature birth.

In the 6 years, 1931–1936, there has been practically no decrease in the mortality rate from premature birth, and in the past 22 years a very slight decrease—from 17.7 in 1915 to 15.1 in 1936. In 1936, the latest year for which such information is available, there were in the United States 32,452

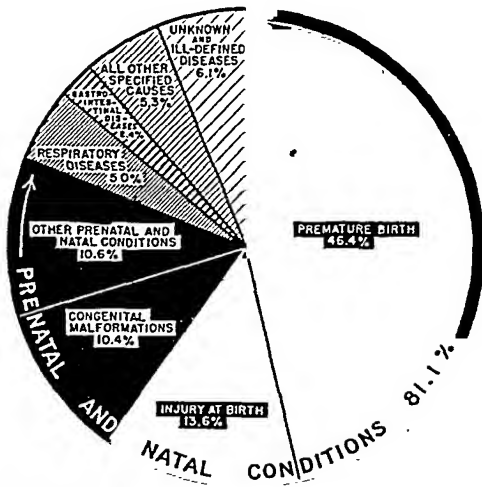
deaths in the first month of life that were reported as due to premature birth. These mortality rates from census re-



Courtesy of Samuel J. Hoffman, M.D., et al., and the J.A.M.A.

FIGURE IV—Same infant 1 year old. Weight, 17 lb. 5 oz.

CAUSES OF NEONATAL MORTALITY
UNITED STATES, 1936



Children's Bureau

FIGURE V

ports do not permit the drawing of as accurate conclusions as would be possible if a standard for reporting an infant as premature had been used by the physicians who signed the death certificates. The consensus of opinion expressed in a resolution by the American Academy of Pediatrics,¹¹ is that all infants born alive who weigh at birth 2,500 gm. (5½ lb.) or less should be treated as premature regardless of period of gestation, crown-heel length, or any other criterion of prematurity. This is the same weight as that recommended as a criterion by the British College of Obstetricians and Gynaecologists.¹² Using this criterion of prematurity—a birth weight of 2,500 gm. or less—7 hospitals have made available to the Children's Bureau comparable reports on more than 4,000 premature infants. Since the mortality among premature infants is highest for those with comparatively low birth weights and lowest for those with comparatively high birth weights the infants reported on by each hospital were studied in four weight groups. In the group of infants in the highest weight group weighing

2,001 to 2,500 gm., in which the best results might be expected, the mortality in these 7 hospitals varied between 6 and 14 per cent; in the group weighing 1,501 to 2,000 gm., the mortality varied between 22 and 45 per cent; in the group weighing 1,000 to 1,500 gm., between 57 and 84 per cent; and in the lowest weight group (less than 1,000 gm.) between 85 and 100 per cent. In the 7 hospitals the total mortality among the premature infants varied between 20 and 34 per cent. From these variations in mortality it is apparent that the mortality among premature infants can be greatly lowered.

In connection with the data reported by the 7 hospitals to the Children's Bureau it should be pointed out that in these reports the infants in the two lower-weight groups constituted a relatively small proportion of all those weighing 2,500 gm. or less—4 and 11 per cent respectively—whereas those in the two higher-weight groups constituted 26 and 58 per cent of the whole group. That these proportions hold in a series of live births that include both mature and premature infants can be seen in Figure VI, in which nearly 2,800 infants born alive in New Haven Hospital, 1928–1932, are represented. Of all the infants weighing 2,500 gm.

PERCENTAGE DISTRIBUTION OF BIRTH WEIGHTS
2,769 LIVE-BORN WHITE INFANTS
New Haven Hospital, 1928–32

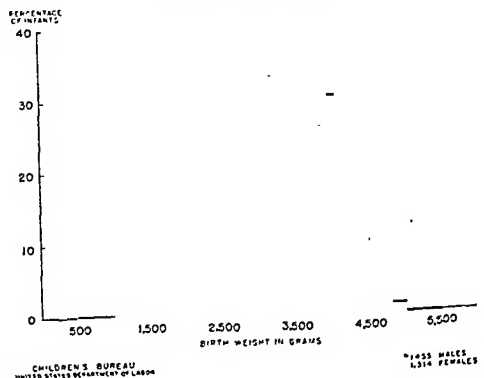


FIGURE VI

or less, those in the lower-weight groups constituted 2.4 and 10 per cent respectively, and those in the two higher-weight groups 25 and 63 per cent respectively.

The advantage of a standard measure, such as a weight of 2,500 gm. ($5\frac{1}{2}$ lb.) or less, to apply when determining the need for special care of premature infants has been pointed out. When such a measure is used statistics can be compiled which make it possible to gauge the success of methods of care, to compare the results of these methods with those used by other workers, and to evaluate new methods of care.

In recent years considerable publicity has been given to the need for the reduction of mortality among premature infants. The Conference on Better Care for Mothers and Babies, held January, 1938, and the National Health Conference, held July, 1938, both stressed the need for reducing neonatal mortality, especially mortality among premature infants.

Thirty years ago three principles for the care of premature infants were enumerated by Rommel.¹³ These are: maintenance of body temperature, proper feeding, and protection from infection. Rommel emphasized the importance of applying warmth immediately after birth and of keeping the infant in a *warm* room. In discussing artificial warmth for the premature infant he named the following among the qualities required in an incubator: simplicity and sureness in operation; cleanliness; ventilation and moistened air (the humidity should be about 60 per cent); accurate regulation of the temperature at 79° to 82° F. He added, "We must admit unfortunately that despite the greatest care there is hardly an existing model which fulfils all these demands." Heated cribs, hot-water bottles, and so forth, were mentioned by Rommel in this connection, and the advantage of these, he stated, is that

the "breathing air" does not become heated.

For feeding, Rommel advocated mother's milk "above all things" and stressed the importance of calculating the amount of milk required by the infant so as to avoid overfeeding or underfeeding. The caloric requirement, he stated, varies "from 130-120-110 calories per kilo of body weight, diminishing with the increasing weight and age of the child." Feedings should be at 2 hour intervals or even shorter ones—10 to 20 feedings in 24 hours. Gavage, or else feeding by means of a pointed spoon, must be employed in feeding very small infants.

Rommel recognized infection as dangerous to the premature infant and stated that prevention may be accomplished most successfully by "skillful attendance." Among therapeutic measures he mentioned the use of oxygen and "injection of artificial serum (20-30 cc.)."

These principles of care, set forth 30 years ago, are still generally accepted as in the main correct but, unfortunately, are far from being generally applied.

What contributions to the knowledge of methods of care of premature infants have been made in recent years? Very little progress has been made, but some of the principles already mentioned, which were developed empirically or from clinical observations, have been established on a more or less scientific basis.

In applying the first principle of care of the premature infant, namely, regulation of the body heat, the air conditioned room has been developed, in which both temperature and humidity are controlled automatically. The old-fashioned incubator has been replaced by modern types of electrically heated beds, the temperature of which is regulated by thermostat. In such a bed the infant breathes the air of the room or

an air mixture that can be controlled. Simpler and less expensive types of heated beds or heated hoods to use on ordinary bassinets or beds have been developed; one of these heated hoods is shown in Figure VII. This is modeled on the type developed by Nobel, modifications of which have been described by Parmalee¹⁴ and by Livingston.¹⁵ In all these types the infant's head is outside of the heated bed and he is breathing the room air. For use in transporting the infant from the delivery room to the special nursery for premature infants, or from home to hospital, heated units have been used which cover the infant completely but allow for ventilation through windows, the size of which can be altered.

Hess and his coworkers¹⁶ have shown that by education of parents and physicians so that they send premature infants immediately after birth to a hospital, and by putting such infants in a portable heated bed for transportation to the hospital the mortality among such infants can be appreciably reduced.

Blackfan and Yaglou¹⁷ have studied in air conditioned nurseries the effect of varying temperature and humidity

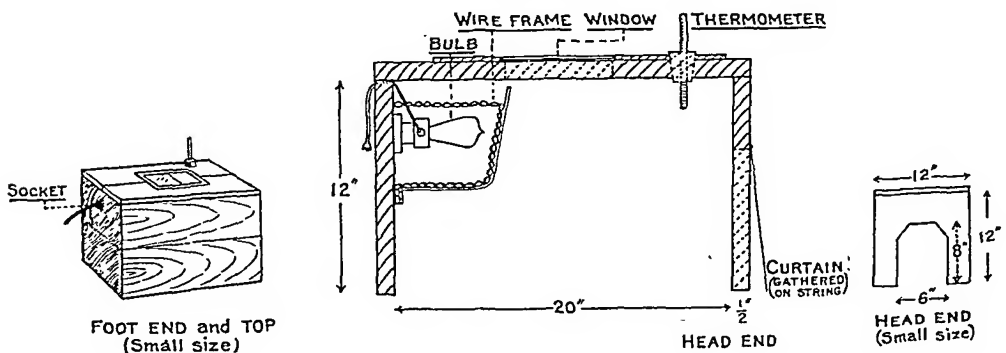
relationships on the well-being of the premature infant, and conclude that a humidity of about 65 per cent and a temperature ranging from 75° to 100° F. constitute optimal conditions.

In regard to feeding premature infants, the consensus of opinion holds that breast milk is the safest food. Some authorities state that when small amounts of breast milk must be given, the milk should be fortified by the addition of carbohydrate.

In using artificial feeding it is, of course, important to consider certain peculiarities of the premature infant when compared with the mature infant. It has long been known that premature infants often show marked difficulty in fat absorption, and Tidwell and his coworkers¹⁸ have demonstrated that certain fats are better absorbed than others. It has long been known that the protein requirements of premature infants are high. Darrow and Cary¹⁹ have found the total proteins of the blood of premature infants to be low, chiefly because of its low globulin content.

The total caloric and fluid requirements of the premature infant must be accurately calculated. The metabolism

FIGURE VII



ELECTRICALLY HEATED HOOD TO BE USED ON PREMATURE BABY'S CRIB

of the premature infant was first studied by Benedict and Talbot.²⁰ Gordon and Levine,²¹ using a specially constructed chamber, have also studied the metabolism of premature infants and have made important recent contributions to the knowledge of the caloric and fluid requirements of these infants in relation to body weight and environmental temperature.

The tendency of the premature infant to develop anemia and the importance of beginning anti-anemic therapy shortly after birth have been demonstrated by Josephs²² and by Davidson and Merritt.²³ The work of Davidson, Merritt, and Chipman²⁴ also has confirmed the long recognized fact that the rapid growth of premature infants makes them prone to develop evidences of vitamin D deficiency, and has shown the importance of beginning effective preventive therapy early. Park²⁵ states that to prevent rickets in a premature infant "it may be necessary to give 1,000, 5,000, or 10,000 units, or for a time even more daily in the form of the highly concentrated fish-liver oils, viosterol in oil, or other vitamin D preparation." Goodwin²⁶ has pointed out that administration of cod liver oil to small, debilitated infants is often fraught with danger, as the swallowing reflex may be inactive and therefore the oil may be aspirated, whereupon lipoid cell pneumonia may result. In view of this danger it is wise to use a concentrated preparation of vitamin D of known potency in a non-oily mixture.

It has been suggested that the premature infant probably lacks certain hormones that are transmitted to the full-term infant through the placenta shortly before or during birth. Some hormones have been administered to such infants, but the benefits derived from them have not as yet been well established.

Bakwin²⁷ has shown that the cyanosis so commonly seen in premature infants

may be due to anoxemia, which can be relieved by the administration of oxygen. A supply of oxygen and proper apparatus for administering it to small infants should be readily available wherever a premature infant is being cared for.

The importance of preventing infection in premature infants has been stressed in efforts that have been made to establish standards for the care of premature infants in hospitals. Those established by Hess²⁸ in the premature unit of the Sarah Morris Hospital have been adopted by the Department of Health of the City of Chicago as part of a city-wide campaign to reduce mortality from premature birth. These include individual equipment for bathing and feeding the infants, proper arrangements for disposal of soiled diapers and linen, exclusion from duty of attendants and nurses with infections, wearing of gowns and masks and washing of hands by attendants, nurses, and physicians, running water readily accessible, and isolation of infected infants. In addition, a regulation of the Department of Health requires that the birth of a premature infant be reported within 24 hours after it occurs.

For transportation to the hospital the infant is placed in a heated portable "ambulance"; the hospitals in the city have been studied and graded according to the facilities afforded for special care of these infants and minimum requirements for hospital care have been set up. These include in addition to those already enumerated the provision of some type of heated bed, a supply of oxygen with necessary equipment for administering it, a thermometer and hygrometer in the infant's room, and—particularly important—provision of qualified nursing personnel. Notification of the board of health is required before the infant is discharged from a hospital. In addition to these requirements certain recommendations are

made, such as attendance of a pediatrician in the delivery room, prompt transfer from delivery room to special nursery, breast feeding, and separate room for care.

Standards for the care of premature infants in hospitals are at present under discussion by a committee on premature infants, appointed by the Commissioner of Health of New York City, and composed of representative pediatricians and obstetricians, the object being to reduce morbidity and mortality among premature infants.

With the same object in view the Division of Research in Child Development of the U. S. Children's Bureau is coöperating in studies of premature infants at New York Hospital. Metabolic studies are being made to determine the food and water requirements of these infants. In addition, a follow-up clinic is being developed at this hospital to improve home care and to obtain data in regard to social and economic as well as health factors affecting the welfare of these infants. The causes of premature birth will also be investigated. Knowledge of these causes is necessary in order to reduce the incidence of premature birth. This aspect of the problem has been greatly neglected.

These programs reflect the increasing interest in the problems of the reduction of mortality from premature birth, as do the most recent plans submitted by the maternal and child health divisions of the various states to the Children's Bureau for approval under the terms of the Social Security Act.

Eight of the 48 states, as well as the District of Columbia and the Territory of Hawaii, have some plan contemplated or already in operation for improving the care of premature infants. The most complete plan is that now being carried on by Massachusetts under the direction of a special division of the health department with a full-

time physician in charge. This program includes enactment of a law making premature birth reportable, establishment of hospital centers for the care of premature infants, and an educational program for physicians, nurses, and mothers. The preventive aspects of the problem are stressed by encouraging the establishment of prenatal centers in hospitals and communities.

The state health departments of New York, Tennessee, West Virginia, Colorado, and Nebraska have provided special warm beds for distribution; those of Wyoming, South Dakota, and Hawaii have planned to provide such beds. Special booklets on the care of the premature infant have been published by the divisions of child hygiene of the state health departments of Massachusetts and West Virginia, and by the U. S. Children's Bureau.

Successful reduction of morbidity and mortality among premature infants requires not only use of the most efficient methods now available for caring for such infants but also continued alertness to the need for the development of more efficient methods of care. Education of parents, nurses, and physicians in the special care of premature infants at home and in hospitals will without doubt save the lives of many premature infants.

REFERENCES

1. Hoffman, Samuel J., Greenhill, J. P., and Lundeen, Evelyn C. A Premature Infant Weighing 735 Grams and Surviving. *J.A.M.A.*, 110:283-285 (Jan. 22), 1938.
2. Hess, Julius H., Mohr, George J., and Bartelme, Phyllis F. *The Physical and Mental Growth of Prematurely Born Children*. University of Chicago Press, 1934, pp. 137-140.
3. Gesell, Arnold. The Mental Growth of Prematurely Born Infants. *J. Pediat.*, 2:680 (June), 1933.
4. v. Sydow, Gert. *Beitrag zur Frage der Entwicklung frühgeborener Kinder bis zu den ersten Schuljahren*. Uppsala, Sweden, 1936. 34 pp.
5. Melcher, Ruth T. Development Within the First Two Years of Infants Prematurely Born. *Child Development*, 8:1-14 (Mar.), 1937.
6. U. S. Department of Labor, Children's Bureau: Causal Factors in Infant Mortality. *Pub. 142*, Washington, 1925, p. 72.
7. Metropolitan Life Insurance Co. Stillbirths and Maternal Mortality. *Stat. Bull.*, 18:6-8 (June), 1937.

8. Yerushalmy, J. Neonatal Mortality by Order of Birth and Age of Parents. *Am. J. Hyg.*, 28:244-270 (Sept.), 1938.
9. Personal communication from Dr. H. N. Bundesen, President, Board of Health, Chicago.
10. U. S. Bureau of the Census. Special reports.
11. American Academy of Pediatrics: Proceedings, Fifth Annual Meeting, June 7, 1935. *J. Pediat.*, 8:117 (Jan.), 1936.
12. A Standard for Prematurity. *Lancet*, 1:1084-1085 (May 7), 1938. See also The Premature Infant. *Lancet*, 1:1118-1119 (May 14), 1938.
13. Pfaundler, M., and Schlossmann, A. *The Diseases of Children*, Vol. II, chapter on "Prematurity and Congenital Debility," by O. Rommel, pp. 81-98. J. B. Lippincott Co., Philadelphia, 1908.
14. Parmelee, A. H. An Inexpensive Incubator for Premature Infants. *Am. J. Dis. Child.*, 41:33-34 (Jan.), 1931.
15. Livingston, Herman H. Incubation. *New Eng. J. Med.*, 207:320-332 (Aug. 18), 1932.
16. See reference 2, pp. 12-15.
17. Blackfan, Kenneth, D., and Yaglou, Constantine P. The Premature Infant. *Am. J. Dis. Child.*, 46, Pt. II, 1175-1236 (Nov.), 1933.
18. Tidwell, Herbert C., Holt, L. Emmett, Jr., Farrow, Howard L., and Neale, Sarah. Studies in Fat Metabolism, II. Fat Absorption in Premature Infants and Twins. *J. Pediat.*, 6:481-489 (Apr.), 1935.
19. Darrow, Daniel C., and Cary, M. Katharine. The Serum Albumin and Globulin of Newborn, Premature, and Normal Infants. *J. Pediat.*, 3:573-579 (Oct.), 1933.
20. Benedict, F. G., and Talbot, F. B. The Physiology of the Newborn Infant. Carnegie Institution of Washington. *Pub. No. 233*, Washington, 1915.
21. Gordon, H. H., and Levine, S. Z. Respiratory Exchange in Premature Infants—Basal Metabolism. *Am. J. Dis. Child.*, 52:810-830 (Oct.), 1936.
22. Josephs, Hugh W. Anemia of Prematurity. *Am. J. Dis. Child.*, 48:1237 (Dec.), 1934.
23. Merritt, Katharine K., and Davidson, Leonard T. The Blood During the First Year of Life, II. The Anemia of Prematurity. *Am. J. Dis. Child.*, 47:261-301 (Feb.), 1934.
24. Davidson, Leonard T., Merritt, Katharine K., and Chipman, Sidney S. Further Studies of Viosterol in the Prophylaxis of Rickets in Premature Infants. *Am. J. Dis. Child.*, 51:594-608 (Mar.), 1936.
25. Park, Edwards A. The Use of Vitamin D Preparations in the Prevention and Treatment of Diseases. *J.A.M.A.*, 111:1179-1187 (Sept. 24), 1938.
26. Goodwin, T. Campbell. Lipoid Cell Pneumonia. *Am. J. Dis. Child.*, 48:309-326 (Aug.), 1934.
27. Bakwin, Harry. Oxygen Therapy in Premature Babies With Anoxemia. *Am. J. Dis. Child.*, 25:157-162 (Feb.), 1923.
28. Hess, Julius H. The Chicago City-Wide Plan for the Care of Premature Infants. *J.A.M.A.*, 107:400-404 (Aug. 8), 1936.

Effectiveness of Different Systems of Collecting Vital Statistics Data*

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WHILE the United States has the distinction of being the first country in the world to provide in its Constitution for a periodic enumeration of population, the general acceptance of the importance of recording births and deaths came about very slowly. It was only 5 years ago that a nationwide system of registration was finally achieved. When one considers that England has had accurate birth and death statistics for 100 and Sweden for almost 200 years, the impulse toward self-criticism is quite natural. It is important to realize, however, that in all logic, comparison should be made not with individual countries but with the entire continent of Europe, not only because of the magnitude of the area of the United States but the fact that it is composed of many autonomous units exhibiting wide geographical variations and important differences in historical tradition, customs, and economic conditions.

Some of the original states evinced as strong an interest in registration as any of the countries of the Old World. Chronologically, the first place in this field belongs to Virginia, which as early as 1632 enacted a law requiring

ministers and church wardens to report marriages, births, and deaths. And by the way, certain procedures set up by this law have remained unchanged for three centuries and were modified only a few years ago. A law similar to that of the colony of Virginia was passed by Connecticut in 1644, by Massachusetts Bay Colony in 1639, and New Plymouth in 1646. The "Fundamental Constitutions" prepared in 1669 for the government of Carolina by the Philosopher John Locke contained stringent provisions for "a Registry in every Seignior, Barony, and Colony, wherein shall be recorded all the births, marriages and deaths that shall happen." According to one writer, "Massachusetts was the first state in the Christian world which recorded births, deaths, and marriages by government officers," as such instead of baptisms, burials, and weddings. The first registration law of modern type was enacted in Massachusetts in 1842 as a direct consequence of the English law of 1837, which made statistics the foundation of modern sanitary progress.¹

In 1847 the United States National Medical Convention, meeting in Philadelphia, urged upon the various state governments "the adoption of measures for procuring the registration of births, marriages, and deaths occurring in their several populations." The Convention, pointing to the "ordinary

* Read before the Vital Statistics Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 25, 1938.

purposes for which such registration should be universally adopted, such as proofs of lineage, rights of dower, and bequests of property," considered the following as the more vital reasons:

First, upon the circumstances connected with the three important eras of existence, birth, marriage, and death, are dependent, to a large extent, the physical, moral, and civil condition of the human family.

Second, a knowledge of these circumstances is necessary for a full comprehension of important means for the certain advancement of the population of states, in prosperity and civilization.²

The example of Massachusetts was followed by other states but progress ceased when the Civil War and its social sequelae occupied the attention of the country to the exclusion of everything else. Agitation in favor of state registration was resumed in the last quarter of the 19th century, but as it was then observed by Dr. Cressy Wilbur, the completion of the task could not come about spontaneously for a long period of time. Dr. Wilbur placed the achievement of the goal as far ahead as the end of the 20th century. That this goal was reached much earlier than had been anticipated was in the main a result of the activities of the Bureau of the Census after its establishment in 1902 on a permanent basis and the energetic coöperation of interested professional and commercial organizations. Another factor, of perhaps equal importance, was the unforeseen growth of ways of communication.

In the history of registration in this country, three distinct stages are discernible. The first, when the formulation and enactment of legislation was largely a matter of local initiative; the second, during which the Bureau of the Census and various unofficial agencies actively concerned themselves with the development of local registration, furnishing advice, technical and, in many instances, financial assistance. We are

now in the third stage, which is in a sense a synthesis of the first two: satisfactory legislation laws have been enacted by all states, which are now directing their energies toward as near an approach as possible to the ideal of complete, timely, and accurate registration and the utilization of records for the public welfare, with the Bureau of the Census acting in an advisory and coördinating capacity.

The function of registration is exercised by the state departments of health with the single exception of Massachusetts, which places this duty upon the Secretary of the Commonwealth.

In order to make possible an intelligent discussion of the subject of this paper, all state registration officials were asked to reply to the following two questions: (1) How are the birth, death, marriage, and divorce records forwarded to the state office? (2) What, in your opinion, is the most satisfactory system for the collection of vital statistics data?

A summary of the comprehensive communications which my colleagues from 36 states were good enough to send me follows:

In 4 states all birth and death certificates are either filed with the county health officers, who transmit them to the state department, or are routed by the local registrars through the county health departments.

In 12 states the certificates are sent direct by the local registrars to the state departments. In one of these states the local registrars also send copies of the certificates to the county health officers.

Twenty states combine the two preceding methods: the certificates are forwarded by local registrars direct to the state department of health, except that in counties having health departments or in sections of states having full-time health units the certificates are sent to these departments or units

for transmission to the state department.

Central registration of marriages is provided for in 23, and central registration of divorces in 10 of the 36 states. In 3 states the state departments receive *copies* and not the original documents.

Birth and death records are forwarded to the central office once a month with the exception of one state, in which the birth records are forwarded once a year, and one other state which provides for the weekly forwarding of these records. The latter arrangement permits the nursing service of the state department of health to establish contact with a family in which there is a new baby within one or two weeks after delivery.

In most of the states, marriage and divorce records are forwarded to the state office once a month; in a few states the records are filed either quarterly or annually.

The views of the state registration officials on the most satisfactory method for the collection of vital statistics data may be grouped into three classes:

1. The original system, which provided that birth and death records should be forwarded by local registrars direct to the state office, has proved its worth and should not be tampered with.

This position is clearly presented by David South, State Registrar of New Jersey: "I am of the opinion that since the present system is so well established and appears so satisfactory, little would be gained by routing the certificates through county health departments. Surely such a procedure would result in a greater loss of records in transit and delay in the filing of records with the state office."

Gerda Pierson, Director of the Minnesota Division of Vital Statistics, is unequivocally opposed to the forwarding of records through a county health department because "Re-routing the returns would undoubtedly result in

delay in their reaching the Department." To meet an anticipated argument, she adds: "The county health officers are furnished much statistical data and other information they desire for their counties by the Division of Vital Statistics, and they have means of securing any special information they may desire in a hurry from the local registrars or other source in the county."

2. The efficient functioning of state registration requires the abolition of local districts in favor of larger units, preferably on a county basis.

Dr. Maysil M. Williams, State Health Officer of North Dakota, is an eloquent advocate of this proposal:

Small registration districts were necessary in the early days, but with the universal use of automobiles and efficient postal service the distance between local registrars could be increased without jeopardizing the efficiency of registration. A physician's practice in rural areas extends for 15 or more miles into surrounding territory. This necessitates knowledge of many local registrars who are changing annually . . . Personal contact and instruction by the State Registrar is impossible due to the large number. Consideration is being given a plan in which there would be one local registrar in each county, with sub-registrars where needed for the purpose of issuing burial and removal permits.

In Nevada, says Dr. John E. Worden, Health Officer of that state, the small population is scattered over such a large area that the county system "is the only practical method," local registrars being retained in a few of the isolated places where there is no local physician.

3. Local registration districts should be retained but in counties having full-time health departments the birth and death records should be routed through these departments.

Dr. W. J. V. Deacon, Director of the Michigan Bureau of Records and Statistics, considers this "the ideal system of registration."

In New Mexico, according to Miss Billy Tober, State Registrar, "The

intermediary stage is essential for the proper operation of county health work." Besides, "progress (in the registration of births and deaths) would not have been made if the personnel in the county health departments . . . had not spent some time on registration work."

Dr. Franklin H. Reeder, State Registrar of West Virginia, finds that the routing of certificates through a county health department "is not only a service to the county health officer, but by keeping his interest in registration alive it often makes him a valuable ally."

In my opinion, the weight of the argument is definitely in favor of the third point of view. Those state registrars who oppose the routing of certificates through county health departments or district state health offices base their opposition on the possible risk of loss of records in transit and delay in the receipt of certificates in the central office. However, if local registrars continue to report to the state office the *number* of births and deaths recorded with them each month and if the county or district office functions properly, the risk of loss of certificates cannot be considered a serious matter. The delay in filing the certificates with the central office need not exceed a few days—sufficient to allow the county or district office to copy and to forward the certificates to the state department of health.

Basic to the entire discussion is the question: Can a county health department or district state health office function efficiently without immediate knowledge of the occurrence of births and deaths in the territory under its jurisdiction? I am not an expert in local health administration, but even superficial acquaintance with it obliges me to reply in the negative. Several registrars have stated that a county health department can secure the neces-

sary statistical guidance from the state office or, if pressed for time, can get the information it desires from the offices of the local registrars. I doubt if a county or district health office could do its best work on a diet of canned statistical food. A complete statistical table prepared in keeping with all rules of statistical practice is one thing, while first-hand acquaintance with the original birth and death certificates is an altogether different matter. The day by day picture of developments in the county or district which a health office needs for proper functioning cannot be supplied even by the most elaborate monthly reports compiled by the state office. As for visits to local registrars, it would be clearly impossible for the county staff to undertake them with the necessary frequency.

In considering the situation in the country as a whole, one is led to the conclusion that here, as in many other elements of our national life, there is no single system that will best serve the needs of the people of all states. In a state like Nevada, with 0.8 person per square mile, efficient registration can be achieved, perhaps, only through the substitution of county for local registrars; while in Delaware, for example, where the density of population is 102 persons per square mile, and where according to Dr. A. C. Jost, State Registrar, even the farthest removed local registrar is within an hour's drive from the state office, registration on a county basis would be nonsensical.

The difficulties of devising a uniform system have been clearly depicted by Dr. W. W. Hubbard, Director of the Tennessee Division of Vital Statistics:

The state is divided into three distinct geographic areas, each having different population and racial distributions, different natural barriers, and a varying distribution of medical facilities, such as hospitals, physicians, etc. Many states have similar prob-

lems. There is probably no uniform system that could be used satisfactorily in all localities . . . It seems desirable to fit the collection system to general area problems. In some communities, it seems best to put all collection into the hands of local health departments, and eliminate intermediate handling by registrars. In some rural areas a local registrar for each minor civil district is imperative. In other counties, consolidation of registration districts is proving effective.

My own belief is that unless conditions make it impossible, the framework of a state registration system should consist of local registration districts, county and district state health offices being used as intermediary stages, *provided these offices have adequate equipment and personnel*. For this reason, the necessary legislative provision should be made optional and not mandatory. In New York State, for example, the desirability of introducing the intermediary stage and its continuance is in each individual instance governed by the judgment of the state commissioner of health. At present this system is effective in all of the 6 counties which have a full-time health department and in 1 state health district comprising 2 counties. The system will be extended to the other health

districts when in the opinion of the state commissioner of health they are able to undertake this function.

It may be advantageous at times to consolidate two or more local districts; such consolidations, however, should be made only after a study of local conditions. There is no need for having separate registration districts in a village and a town if, as it often happens, the town registrar is also town clerk and the town hall is located in the village. On the other hand—to recall a recent case—consolidation would be definitely against the public convenience if the township were cut in two by a mountain range which is barely passable in inclement weather. The merits of one or another system must be weighed in terms of our basic objective—complete, timely, and accurate registration of all births and deaths. Short-cuts may be considered only if they do not endanger this aim.

REFERENCES

1. Wilbur, Cressy L. *The Federal Registration Service of the United States, Its Development, Problems, Defects*. Government Printing Office, Washington, 1916.
2. *Buffalo Medical Journal and Medical Review*, 3 (June), 1847.

DISCUSSION

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I VERY cordially agree with the idea that birth and death records should pass through the hands of the full-time county health office before reaching the central office of the State Department of Health.

It has been my observation that health officers ten or twelve years ago minimized the importance of vital statistics records in their counties, and,

in fact, at that time I could secure very little coöperation from these officials in my efforts to obtain as near 100 per cent registration as could possibly be done.

The health officer was fully alert to other duties such as school examinations, vaccinations, and public health education in general, but it seems that he considered vital statistics of very

minor importance in his program, not realizing, of course, the leading position which these statistics should have occupied in planning his various and sundry public health endeavors.

In recent years, however, it has been noted that the health officer not only realizes his need for vital statistics, but is keenly alive to any suggestion which may be made to him for obtaining a full and complete report of every birth and death occurring in his territory. Also, they are asking and demanding that we place in their hands the birth and death certificates of their sundry counties before such records are forwarded to the central office.

Our health officers are not only making immediate use of these statistics for guides in public health work, but they are keeping card records of births and deaths in their files from year to year.

It adds very much to the prestige of the county health department to be able to give information locally, especially to school authorities with reference to ages of children first entering school. Also, this ability to show the information needed relieves the central office of a great deal of searching among the records for identical purposes.

It seems reasonable to me that since conditions have changed to such a remarkable extent within the past 25 years, every state should seriously consider the proposition of whether or not its methods of gathering birth and death certificates have changed with the times. In the year 1912, when our State Department was first organized, there were scarcely any automobiles, no good roads, the doctors were scattered throughout the rural communities, and home-made coffins were used in a large percentage of burials throughout the rural areas of our state. Undertakers were, of course, operating within the larger towns, but very few

of them attended to funerals at a greater distance than 12 miles away from their places of business.

At this time we can travel almost anywhere in the State of Mississippi in any sort of weather, and although we have been somewhat behind with building fine highways, we are now spending millions of dollars in the construction of modern roads. The doctors, as a rule, have congregated in the towns, the undertakers travel sometimes as far as 200 miles to bury the dead, and it does seem to me that we have no reason to cling to antiquated methods of filing birth and death certificates. Therefore, we now have barely more than 100 registrars of vital statistics in Mississippi, whereas, 10 or 15 years ago, we had over 1,000. In order to make smoother the operations of the county registrar, it was necessary to abolish the burial permit in all communities of less than 5,000 population. Of course, we require a transit permit for all bodies shipped out of Mississippi into other states.

As I have stated heretofore in these meetings, it is no more logical to require an undertaker to obtain a burial permit, than it is to force a physician to get a permit to attend a birth. No one seems to argue any other motive for the burial permit than to make, or attempt to make, more certain the filing of the death certificate. Our experiences in Mississippi show that the undertaker will come just as near filing the death certificate without obtaining a burial permit as he did when he had to obtain one, and, to tell the truth, his death certificate is more accurate when given a little time for its completion than it was when he had to get it ready to trade in for a burial permit before the body was disposed of.

However, I am ready to grant that in some states it is easier for an undertaker to prepare a death certificate and

obtain a permit before disposition of the body than it is in a state with a great deal of rural territory.

From what I have learned so far, several southern states have made much headway in consolidating registration

areas. It seems they are not eliminating the burial permit, but the methods they prescribe for such permits seem to me to be rather crude, and constitute ample proof that this formality is unnecessary.

The Nine Plank Platform of Andriya Stampar

DR. Andriya Stampar, of Yugoslavia, one of the great contemporary public health administrators, is visiting this country this summer. His own summary of his views on public health is reproduced below¹:

- (1) The education of the people is more important than laws, and for this reason our work (in Yugoslavia) is based upon three small laws only.
- (2) It is most important to prepare a correct attitude of society towards questions of public health.
- (3) The question of public health and of the work done for its advancement is not a monopoly of the doctors; but everyone, without distinction, should take part in it. It is only by means of this universal coöperation that public health can improve.
- (4) A doctor should be mainly a social worker; he cannot go far with individual therapy alone—social therapy provides the means that can lead him to real achievement.
- (5) A doctor should not be economically dependent on his patients because such de-

pendence hinders him in the most fundamental of his tasks.

- (6) In respect to public health no distinction should be made between the rich and the poor.
- (7) It is necessary to create a health organization in which the doctor shall seek out the patient, and not the patient the doctor, for it is only by so doing that the ever-increasing numbers of those whose health we should protect can be included in our care.
- (8) A doctor should be a teacher of the people.
- (9) The question of public health has more of an economic than a humanitarian significance. The chief place for a doctor's work is in the dwellings of the people—the places where men live and work—and not in laboratories or in a doctor's consulting-rooms.

The story of Doctor Stampar and his career as chief of the Department of Public Hygiene in the Ministry of Social Institutions of Yugoslavia is told by Louis Adamic, in Chapter XVI, *The Native's Return* (New York: Harper & Bros., 1934).—New York State *Health News*, July 3, 1939.

1. From Sigerist, H. E. Yugoslavia, *Bull. of the History of Medicine* 7:99, Jan., 1939.

Infection of Air*

Bacteriologic and Epidemiologic Factors

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CONCENTRATION of microorganisms in air (the number dispersed in unit volume) implies some degree of confinement. The potential hazard of infection from the air breathed in the semi-confined spaces of our habitations may be represented for any moment in time by the equilibrium between the addition rate of microorganisms and the rate of their elimination. A bacteriologic technic for the measurement of sanitary ventilation, inversely determining confinement, has been previously described.¹ The rate (K) at which bacteria suspended in semi-confined atmospheres are vented or killed may be determined directly, and changes in ventilation rates may be computed from the formula $P=C/K$ where the equilibrium (P) is measured and the rate of addition (C) of bacteria is maintained constant.

CONFINEMENT OF AIR-BORNE MICROORGANISMS

If air displacement alone in ventilated rooms is to be measured, no advantages are claimed for bacteriologic

procedures over gasometric methods.[†] In measuring infection and disinfection of air, however, the bacteriologic procedure offers a means of interpreting biologic ventilation in terms of air replacement. The rate at which viable microorganisms disappear from a semi-enclosed atmosphere through physical, chemical, or biological means can be expressed as equivalent ventilation (based upon air replacement).

The importance of distinguishing between the hygienic potentialities of bacterial ventilation by air displacement and by other means of disinfecting habited atmospheres has become evident from analysis of some 1,750 air samples, collected in studies on sanitary ventilation to be reported later. During the winter months, associated

† The equilibrium formula applies equally well if CO₂ is added to a room at a known constant rate (C). Let the rate of addition of CO₂ per person per hour (C) be 0.5 cu. ft.² With an air space of 200 cu. ft. per person,³ the addition rate (C) = $0.5/200 = 0.0025$ volumes per hour. With an air replacement of 1,200 cu. ft. per person per hour,³ the removal rate (K) = $1,200/200$ or 6 overturns per hour. The equilibrium (C/K) will be $0.0025/6$ or 4.2 volumes of CO₂ per 10,000 volumes of air. With an outside concentration of between 3 and 4 volumes per 10,000 the inside concentration would lie between 7 and 8 volumes. "Pettenkofer, in 1858, proposed 10 volumes of carbon dioxide in 10,000 volumes of air as a limit for inhabited rooms. DeChaumont (1875) found that an unpleasant odor became perceptible in air containing 6 volumes of carbon dioxide in 10,000, and fixed this as a limit, which for many years was accepted by sanitarians."²

* This study is supported by a grant from the Commonwealth Fund to the University of Pennsylvania for investigations on air-borne infection, with laboratories in the Department of Bacteriology, the Children's Hospital of Philadelphia, and the Henry Phipps Institute for the Study, Treatment, and Prevention of Tuberculosis.

with the spread of respiratory infections, when the closing of doors, windows, or other natural vents confines the air commonly breathed by many persons, natural ventilation rates fall below 10 overturns per hour. To double air replacements, during cold weather, by mechanical or window ventilation raises practical difficulties, and has led to no conspicuous decline in respiratory diseases. With the opening of windows in the spring such infections consistently decline, with ventilation rates approaching 100 overturns per hour. Whether equivalent bacterial ventilation by air disinfection during the winter can accomplish similar hygienic results is an important problem in sanitary science.

An example of the solution of a general problem of sanitary ventilation by means of air disinfection, through experimental methods applying the bacteriologic procedure, is provided in the study and design of isolation cubicles in which ultra-violet light screens replace solid partitions or in which there is dropped a curtain of light continuous with an irradiated reservoir or "ceiling" above the eye level into which any solid cubicle partitions project.⁴ Such cubicles, the experimental units of which were built and tested in the Henry Phipps Institute, Philadelphia, are now in routine use in the new building of the Cradle Society, Evanston, Ill. (Figure I). Sanitary ventilation tests upon the bacterial tightness of the experimental cubicles indicated: (1) in Type A cubicles (i.e., with solid partitions between cubicles, ultra-violet light curtains between cubicles and corridor), 99.6 per cent of the test organisms were removed in passing from the corridor to the cubicle, 98.9 per cent in passing from the cubicle to the corridor; (2) in Type B cubicles (i.e., where partitions between cubicles also were replaced with a curtain of ultra-violet light), 99.7 per cent of the test organisms were

removed in passing from cubicle to cubicle. Tests upon the cubicles in the completed building, under actual operating conditions, have exceeded the results in the experimental unit.

Trial installations of light barriers have also been designed for the Children's Hospital, Philadelphia, and the Infants' and Children's Hospital, Boston, and such cubicle isolation would seem generally applicable to hospital use.

BACTERIOLOGIC FACTORS

Methods—The equilibrium between the infection rate and the ventilation rate of the air of our habitations varies with a multitude of factors such as season, weather, variations in activity from day to day, hour to hour, or even minute to minute. The statistical constants which define these variable characteristics depend upon the analysis of numerous samples and, since air is a rarefied medium, upon large volumes. Examination of so changeable a medium requires an instrument adaptable to extensive field service. Simplicity and directness in technic are practical prerequisites both of economy and accuracy in any widespread sanitary survey.

It goes without saying that a method must be determinate, that with each condition a definite result is obtained, and that these results under uniform conditions are reproducible within the normal variation of the conditions themselves. It is a matter of convenience that the results be quantitatively proportionate to variations in conditions, or bear some simple functional relationship. "Absolute bacterial densities" are mere abstractions useful only in interpretation, and never delivered by bacteriologic technics.⁵

The numbers and kinds of organisms recovered from an air sample also depend upon the conditions of culture. An instrument must be flexible enough to permit the use of various culture

media. Direct collection on the culture medium may be desirable with sensitive parasitic organisms which quickly perish in the air. Organisms growing readily at blood temperature have been found in sanitary water analysis to be more indicative of pollution than those growing at room temperature, and the same principle holds in sanitary air analysis.⁵ Whereas intestinal organisms are of primary concern in drinking water, nasopharyngeal organisms have significance in the air we breathe. Whereas gas formation in lactose broth is characteristic of intestinal contamination, green-producing streptococci (on blood agar) typify nasopharyngeal contamination. While special technic may be required in the search for pathogens or in special problems, the most serviceable method for general sanitary air analysis uses blood agar incubated at body temperature.

Results—Results of some two thousand air samples collected and analyzed by the Wells technic⁶ are summarized in Table I. About one-third of these samples were analyzed in the authors' laboratories, with the assistance of several collaborators acknowledged in reporting the various studies. The remaining two-thirds of the samples were collected by the WPA Air Pollution Survey of the Department of Health of New York City,⁷ and are indicated in the table by a dagger.

The textile mill samples represent atmospheres during a period of economic depression rather than the busy activity of better times. The average count given for Mental Hospital A does not give a complete picture for it averages the highest counts obtained under actual living conditions with lower counts which obscure this fact. The high streptococcus counts, however, may reflect the dissemination of respiratory organisms associated with the epidemic of pneumonia during which the samples were taken. The theater tests

may also seem unnaturally low, and in the case of the Boston results we know the samples were taken between the warm and cold weather when the ventilating system was operating at its full capacity to exhaust the heat generated within the theater. In the results of subway samples as reported, there is nothing to indicate the jam during rush hours, nor does the report specify the conditions under which the samples were taken.

No pretense of precision can, therefore, be implied in this summary because standardization of collection and of isolation technics has not yet been perfected. Blurring due to imperfect technic may account for the want of contrast between some of the categories as compared to the clear definition observed among other categories. Want of technical skill in many of these laboratory analyses cannot be denied, any more than can perfect analysis compensate the failure of collections to represent truly their assumed classification—a more serious matter.

SANITARY INTERPRETATION

In spite of these imperfections, however, the categories exhibit significant differences which serve the primary purpose of this paper. The difference between the counts of indoor and outdoor air is outstanding. Most samples classed as "indoor air" were taken during the colder months when "indoor air" was "confined air." The mill samples, though collected during the summer, represent air confined in order to regulate the humidity.

Exclusion of Polluted Atmospheres—Particularly in hospitals, where pathogenic sources are known to exist; may high total count signify increased hazard of infection. The provision of independent air supplies in special wards or rooms (as the premature ward of the Infants' Hospital in Boston)^{8, 9} where asepsis is a vital consideration

TABLE I

Sanitary Analyses of Air Supplies of Various Human Aggregations

	Number of Samples	Average Number of Colonies per Sample *	
		Total	Alpha Streptococci
<i>Outdoor Air</i>			
Boston, Longwood	72	16	0.12
Philadelphia, downtown	23	50	0.0
New York, streets †	143	112	0.45
New York, Central Park †	13	30	0.3
Outside various textile mills	14	46	0.0
<i>Indoor Air</i>			
I. Experimental			
Quiet	21	20	0.0
Sneezing	14	3,090	2,200.0
Empty after sneezing	4	1,440	920.0
Using handkerchiefs while sneezing	7	66	1.0
II. Hospitals			
Infants' and children's wards	160	496	0.8
Premature ward, separately air conditioned	26	20	0.0
Chapple incubator, separately air conditioned	92	18	0.0
Miscellaneous wards	13	247	2.9
Operating rooms			
During operations	6	450	...
Between operations	7	55	...
Children's out-clinics	28	728	13.3
III. Institutions			
Mental Hospital A, all wards	42	1,977	21.0
Mental Hospital B, senile ward			
Without ultra-violet lights	9	2,938	7.8
With ultra-violet lights	7	468	1.9
IV. Schools			
Public, New York †	707	296	1.8
Public, Watertown (Boston)	27	183	8.2
Private, Philadelphia	50	151	1.1
College laboratories and lecture rooms	22	106	1.4
V. Assemblies			
Theater, air conditioned, Boston	22	56	1.2
Theaters, New York †	253	72	0.3
VI. Industrial			
Textile mills			
Dusty (carding, etc.)	17	2,425	0.0
Settled (spinning, etc.)	17	261	0.0
Humidified (weaving, etc.)	21	275	0.0
VII. Transportation			
Railway cars, air conditioned			
Without ultra-violet lights	16	440	4.3
With ultra-violet lights	9	127	0.5
Subway cars, New York †	290	192	0.85

* The samples were approximately 10 cu. ft., but the accuracy of sampling and isolation by various workers does not warrant more precise analysis

† These figures are computed from Pincus and Stern, *A.J.P.H.*, 27:321, 1937.

can be justified by the bacterial purity indicated by the tests. A study of the sanitary ventilation of Chapple infant incubators¹⁰ supplied with clean outside air clearly shows the sanitary superiority of the air within the incubators over that of the wards in which they were placed.

Qualitative Differentiation by State of Suspension—Interpreted in conjunction with other observations much valuable information upon the quality of the contamination may sometimes be derived from bacterial counts. In the study of textile mill atmospheres¹¹ the ratio of bacterial concentration as determined by the centrifuge to plate settling count proved of great value in distinguishing between bacterial contamination derived from dusty operations and that contributed by humidification with polluted water. The differentiation of contamination derived from such widely different sources is necessary to a proper hygienic evaluation of the bacterial content of the atmospheres.

Settling and Sedimentation—Quite apart from such qualitative sanitary distinction the settling rate of bacterial-laden particles as determined by the ratio of plate count to that obtained by the centrifuge provides the key for interpreting the flight range of air-borne infection in space and time. Sedimentation in still rooms is an important factor in removing dust from the air.¹² The accumulation of settled infected dust¹³ may, however, provide a dangerous source of reinfection. In operating rooms, preparations just preceding an operation may stir up accumulations, deposited over a long quiescent period between use and concentrate infection from distant parts of a hospital.

Particle Size and Purification—The coefficient of fineness, derivable from settling velocity,¹¹ may be a factor in the efficiency of purification devices which depends upon the physical char-

acteristics of the particles. Such distinction between bacteria introduced into air by evaporation of salivary droplets and bacteria raised as dust by processes of attrition may be of vital importance in the hygienic interpretation of bacterial tubes. This is well illustrated in efficiency tests of a railway car installation of ultra-violet lights which showed a much higher effectiveness against nasopharyngeal organisms than against the wild varieties enclosed in dust raised by activity within the car.

INDICES OF NASOPHARYNGEAL CONTAMINATION

The hygienic significance of breathing microorganisms fresh from the respiratory passages of others cannot be ignored. The numbers of streptococci characteristic of the nasopharynx indicate a hazard of respiratory infection and have a sanitary significance comparable with the presence of *Escherichia coli* in drinking water.¹⁴ Examination of averages in Table I shows how these numbers vary with the condition of occupancy.

Specific Infectivity—Fluctuations dependent upon sneezing are indicated in experiments from which it is estimated that several thousand nasopharyngeal streptococci per sneeze are contributed to the atmosphere. The sneeze thus almost seems to be a provision of nature for the survival of nasopharyngeal parasites. Even where the manifestations of a disease do not provide for the wide auto-dissemination of the infection through air it has been observed that an outbreak of colds will be followed by the rapid spread of contagion.^{15, 30} Sneezing induced by pollens might conceivably facilitate the spread of nasopharyngeal infection, and has indeed been suggested as a means by which the unseasonable spread of poliomyelitis is aided.¹⁶

These experimental results are borne

out by the field observations of Huddleston and Hull¹⁷:

During February, 1919, there existed in the Army of Occupation what amounted to an epidemic of severe "colds" with extremely bad coughs and sore throats. Pneumonia cases were numerous. The first experiment was conducted on February 23. . . .

It will be seen that in one minute an average of 82 organisms settled on the plates, and in five minutes, 151 organisms. . . .

In picking colonies indiscriminately from the incubated plates four type IV pneumococci were found, and many hemolytic and non-hemolytic streptococci, with numerous staphylococci and Gram-negative and Gram-positive diplococci. . . .

Eight days later (March 3), the experiment was repeated. . . .

By the first of March the epidemic had practically cleared up. . . .

The details of operation were identical in every particular—the same medium being used and the same methods. On the plates exposed 1 minute and 5 minutes the organisms found were extremely few in number. On the plates exposed 10 minutes an average of 16 colonies was counted. Among these, molds and staphylococci predominated; no pneumococci were found; 16 per cent of the total number of colonies present were streptococci, which showed partial but not complete hemolysis (alpha type).

This great reduction from 82 organisms in 1 minute to 16 organisms in 10 minutes, which settled on the plates directly corresponded to the falling off of the epidemic. In either case, however, a man sitting through a performance of 1½ to 2 hours would inhale enough pathogenic organisms to give him any respiratory disease which might prevail among those sitting about him, provided he did not possess some natural or acquired resistance.

The prevailing organism present in the respiratory passages of men admitted to the hospital at this time was *Streptococcus hemolyticus*.

Sanitary Indices of Pollution Load

—The impression gained from inspection of Table I that the numbers of alpha streptococci in the atmospheres we breathe conform in a general way to the density of occupation and the degree of air confinement, is strengthened by a more detailed analysis of the New York figures.¹⁸ Thus in reporting on

the 6 schools selected in the New York study, the authors state:

Schools numbers 1 to 3 have higher average numbers of streptococci per cu. ft. of air for all samples and for positive samples, as well as a greater percentage of positive samples, than do schools 4 to 6.

Schools 1 and 2 are two of the oldest in the city and are in the lower east side. They are of definitely inferior construction, contain small rooms, and are difficult to keep clean, number 1 being the poorer of the two. It may also be of interest that the children are of the lowest economic group in the city, and come from a health area which shows a high incidence of reportable communicable disease. Schools 5 and 6, the two high schools in the group, are located in the upper middle west side. While of more modern construction than the first two schools they cannot be called new. They are of more suitable design than the former, however, since they have large rooms, large windows, and high ceilings.

With respect to degree of occupancy they state:

The values for the average number of streptococci per positive sample for all schools indicate that occupied assembly rooms had most alpha streptococci, followed by occupied classrooms, corridors, just vacated classrooms, vacant assembly rooms, and vacant classrooms in the order named.

Table II likewise shows a relationship between passenger load of a railway car and the numbers of alpha streptococci present in the air. The ratio of streptococci count to passenger load for every moment in time obviously is not constant, but varies with activity of the passengers contributing to the atmosphere.

Hygienic interpretation of these results in the absence of extensive epidemiologic correlation can be based only upon general sanitary principles gained primarily from long experience with water supplies. The ingestion of intestinal organisms indicated by the presence of *Escherichia coli* in one-tenth of the volume of water consumed per 24 hours per person approximates a limit of safety set by the U. S. Treasury

TABLE II

*Relation Between Passenger Load and Bacterial Content of Air of Railway Car
(With and without ultra-violet light in air-conditioner)*

Ultra-Violet Lights Off

<i>Tube Number</i>	<i>Sampling Time (in Minutes)</i>	<i>Number of Passengers</i>	<i>Total Bacteria</i>	<i>Alpha Streptococci</i>
1	20	65	209	0
2	10	..	1,022	9 plus
3	20	69	1,324	5 plus
4	10	..	466	8 plus
5	20	82	418	15 plus
6	10	..	1,324	7 plus
7	20	75	860	23
8	10	..	372	4
9	20	52	929	5
10	10	..	209	2
11	20	48	372	6
12	10	..	442	1
13	20	30	1,069	3
14	10	16	325	2
15	20	1	232	0
16	10	6	232	1

Ultra-Violet Lights On

17	20	15	349	2
18	20	28	256	3
19	20	39	232	0
20	20	..	139	0
21	20	43	302	0
22	20	..	302	1
23	20	48	232	0
24	20	55	186	0
25	20	55	279	1

Standard¹⁹ for drinking water. The inhalation of more than 10 times as many respiratory organisms in the same period is indicated by the presence of three alpha streptococci per sample of 10 cu. ft.

EPIDEMIOLOGIC FACTORS

Sound sanitary principles appropriate to ingested infection from drinking water cannot be applied arbitrarily to an inhalation theory of the spread of respiratory disease without confirmation of the underlying assumptions. They may, however, lead to more fruitful hypotheses than the smug logic familiar to the early advocates of pure water that the air breathed "all one's life" cannot help to explain the universality of respiratory infection. Where the

droplet theory has led only to a hopeless attitude toward the sanitary control of respiratory disease, a theory of air-borne infection, based upon the wide dissemination of *droplet nuclei* through occupied spaces,²⁰ promises such sanitary methods for building up community resistance against the spread of this important class of infections as have proved so successful in controlling spread of insect-borne and intestinal disease.

Topley and Wilson²¹ clearly indicate the potentialities of increasing community resistance by control of the sanitary factors involved in the spread of infection.

The herd, like each of its members, has a characteristic structure; and this structure, from our present point of view, includes

not only the hosts belonging to the herd species, and their spatial relationships to one another, but the presence and distribution of alternative animal hosts and possible insect vectors of infection, as well as all those environmental factors that favour or inhibit the spread of infection from host to host. This herd structure, apart altogether from the susceptibility or resistance of the individual hosts, may play a decisive part in the immunity of the herd as such. A herd may be immune to a particular disease—in the logical sense that it will resist the introduction of infection from without—although each of its members is fully susceptible, and would fall an easy victim if he strayed to a herd with a structure that allowed an endemic prevalence of the disease in question. In this sense the English herd is immune to plague; because the association of man, the rat and the flea is not now of a kind to allow spread along natural routes. It is probably immune to cholera, as the result of an adequate system of water purification. It is not—nor does it seem likely to become—immune to any of those diseases that are spread by droplet infection. It would take us altogether beyond our present scope to consider the known or problematical effects on herd resistance of such changes in environmental conditions; but we may at least note that many of the most striking successes of preventive medicine have been attained by altering herd structure without inducing any increased resistance in its individual members. By attacking insect vectors of infection, such as the mosquito, by preventing the frequent passage of bacteria from one person's intestine to another person's mouth by way of water and food, and by a general improvement in environmental conditions, we have succeeded in eliminating, or reducing to negligible proportions, diseases that formerly took a heavy toll of lives, and still take that toll in areas where such measures are not applied.

Substitution of the words "community resistance" for "herd immunity" would better contrast sanitary resistance to the spread of infection through a community with that conferred upon a herd by the specific immunization of a portion of its members.

If bacteriologic interpretations are corroborated by epidemiologic experience, sanitary ventilation, based upon a theory of air-borne infection by drop-

let nuclei, promises to become an important factor in public health.

SPREAD OF INFECTION THROUGH AGGREGATIONS

The hypothesis that contagion may be spread through the common occupancy of semi-confined atmospheres defines an epidemiologic pattern in terms of sanitary ventilation. Though sanitary and epidemiologic indices of ventilation have never been specifically correlated, extensive data on the spread of respiratory infection through various human aggregations sharing common atmospheres have accumulated. General correlation between types of ventilation characterizing these types of aggregation and epidemiologic indices derived from these studies reveals the consistency between our interpretation of the bacteriologic measure of air infection and the spread of respiratory disease.

Continuous Aggregations—The spread of disease through semi-confined atmospheres is not always an obvious phenomenon. Since the individual normally shuttles from aggregation to aggregation, it is generally impossible to distinguish the atmosphere within which an infection is contracted. Even where respiratory infections are known to be contracted within a continuous aggregation of individuals, only under special circumstances can sources other than air be entirely eliminated. In a careful study of the spread of infection in the Infants' Hospital, Boston, McKhann and his associates²² report 134 acute respiratory infections developing among 1,455 admissions during 1935 and 1936. Converted on the basis of the time of residence, this attack rate becomes an annual rate corresponding to epidemic spread of water-borne intestinal infection (more than 100,000 cases per annum per 100,000 population at risk). In a further analysis of these data,⁹ they conclude that contact infection,

droplet infection, and droplet nuclei infection are all operative within the hospital, and that a clear distinction must be made in the proportion of infections attributable to each mode of spread in an appraisal of methods of control. He distinguishes the principles of control applicable to each mode of spread, and will later report upon experimental control measures. He is extending to cubicle isolation the principle of an ultra-violet light barrier against droplet nuclei infection, inaugurated nearly 2 years ago in a corridor. He also remarks upon the striking reduction of respiratory infections in the premature ward,⁸ correlative with a demonstrated reduction in bacterial contamination, consequent upon the installation of an independent outside air supply (see Table I).

By means of the newer laboratory technics which permit cross-infections to be traced as both clinical cases and subclinical infections, we are coming to realize how much more numerous they are than had been supposed. Clinical cases of certain nasopharyngeal infections may constitute, according to advanced work, particularly in England, mere outcroppings of epidemic strata of subclinical infection which can be located by the newer technics of bacterial typing.²³ By such procedures the latent image of the mode of spread of nasopharyngeal infection, manifest in such diseases as measles and influenza and deducible from epidemiologic studies of age incidence and immunity tests,²⁴ may be developed.

Intermittent Aggregations — The spread of infection through intermittent aggregations may often be traced by the characteristics of the disease. The incubation period in some of the common infectious diseases of childhood, where lasting immunity is conferred, links primary with secondary cases. Every "contagious" case is secondary in some one aggregation, though it may or may

not be a primary to other cases in that or other aggregations. The number of secondaries thus exceeds the number of primaries except in the limiting case of perfect endemicity where the number of secondaries equals the number of primaries and there is no change in the rate of incidence. The sharper the epidemic, the more do secondaries exceed the primaries.

The spread of contagion through various types of aggregations describes the progress of an epidemic through the community. It is evident from Wilson's intensive study²⁵ of the epidemiology of measles in Providence that the 6 to 7 year old group of children provides the stratum of the population in which lies the reservoir of measles from which family primaries are drawn. This is true whether a younger or an older child is the primary in the family. Thus an elder child passing through this stratum without becoming a family primary is more likely to become later a secondary to a younger primary drawn from this stratum. The ratios of secondaries to primaries in the aggregations constituting this reservoir may vary independently from the ratios of secondaries to primaries in the family aggregations. Epidemic surges, therefore, arise from the interlocking of these various aggregations forming the knots in the vast network of contagion.

The family has been a favorite aggregation for the study of these phenomena:

One of the most characteristic features in the epidemiology of the common acute communicable diseases is the grouping of cases in time and space; and this is especially apt to be noted in the group which constitutes a household, people in close contact with each other, sharing a common environment, mostly of close kinship, and usually under the eye of at least one medical or lay observer whose observation encompasses the whole group.

Thus did Frost²⁶ introduce a discussion of "Familial Aggregations of In-

fectious Diseases" based upon Chapin's classic work on secondary attack rates. In 1925 Chapin showed that 88.3 per cent of presumably susceptible children of ages 1 to 5 contracted measles when a case was introduced into the home.²⁷ He concluded further:

Scarlet fever, consequently, is in reality much more contagious than the diagram would indicate, for the number of non-immunes is less than formerly assumed. It therefore seems probable that the greater contagiousness of measles, as suggested by Diagram III, is to a considerable extent apparent only. . . . Indeed, it is possible that diphtheria might be proved to be not so very much less contagious than measles. . . . We have no data in Providence bearing on the contagiousness of smallpox, but certain facts, from other places indicate that it approaches measles in this respect.

Dyer²⁸ quotes Rist and Weiss and Zingher and others who—

have noted the tendency of children of the same family to give similar reactions to the Schick test, and that in case of variations, as a rule, the younger children have shown positive reactions and the older negative, the reverse of this being very rare.

In response to the Dick test, Dyer's own results among 263 families of two or more children showed that: (1) in 151 instances all were Dick positive; (2) in 30 instances all were Dick negative; (3) in 41 instances younger children were positive, older were negative; (4) in 25 instances younger children were negative and older children were positive; (5) in 16 instances in family groups of three or more children, other combinations were shown. That is to say, in only 15 per cent of the 263 families was a younger child immune and an older child susceptible.

Similar phenomena with respect to tuberculosis among families is reported by Opie and McPhedran²⁹:

When latent tuberculosis is taken into consideration, tuberculosis exhibits the characters of a contagious disease and affects all children of households within which some member, suffering with tuberculosis, scatters tubercle bacilli.

As regards the spread of homologous types of pneumococci among family contacts, the Advisory Committee on Prevention of Pneumonia Mortality state³⁰:

The findings obtained in a few studies of a small number of families suggest that when pneumonia due to one of the more virulent types, for instance Type I, occurs in an individual, about 20 per cent of the other members of the patient's family are also carrying that same type of organism in their noses or throats. Where acute upper respiratory infections, such as colds, are prevalent among the family contacts, the incidence of homologous type carriers may approach 70 or 80 per cent.

The interesting epidemiologic fact³¹ that the average age at which first-born children contract clinical poliomyelitis is greater than second-born, second-born greater than third, etc., suggests simultaneity of infection, clinical or subclinical, within the family. The family pattern of subclinical infection would, therefore, be similar to the family pattern of clinical infection in the case of measles. The epidemiologic study of immunity by birth order in a family gives such distribution of age incidence as would follow the assumption that the introduction of an infection into a family leaves the exposed members of the family immune if they do not contract a clinical case of disease.

Time of Exposure—It appears from such experience that a susceptible child breathing the air in a home harboring a contagious case seldom escapes infection, either manifest or latent. Here the time element in exposure (early observed by Denny³²) characterizes airborne infection. Both the case and the victim continuously breathe the same atmosphere for extended periods of time. In schools, on the other hand, the time of exposure is markedly reduced by the prompt removal of detected cases. Boarding schools in this respect are intermediate between day schools and homes. In a very thorough

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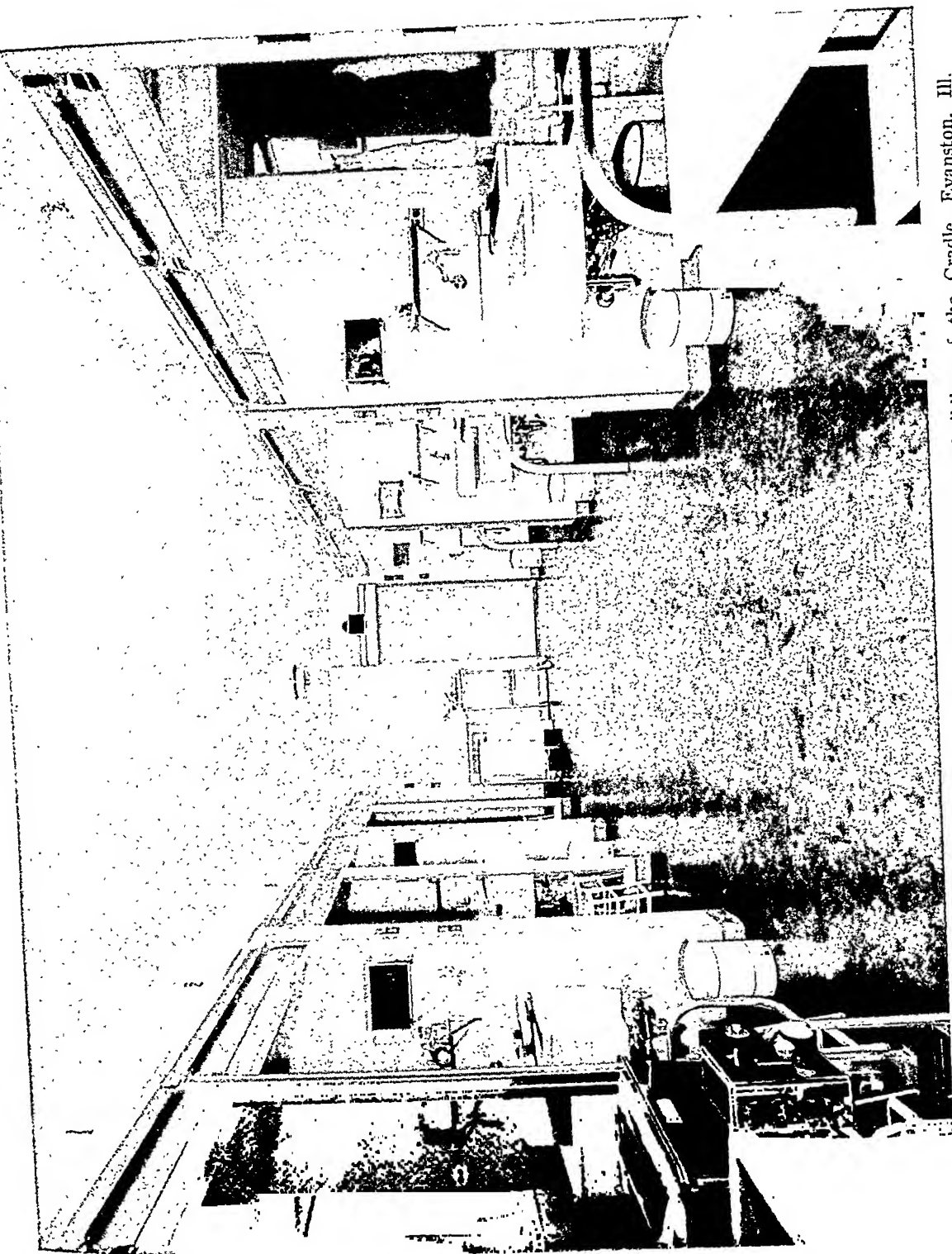


FIGURE 1—Sanitary ventilation by means of bactericidal radiation in new building of the Cradle, Evanston, Ill.
Ultra-violet light barriers separate cubicles from corridor. In right tier of cubicles, ultra-violet light curtains also replace alternate solid partitions.

SPARY
DE COLLEGE OF
SURGERY



FIGURE II.—Droplet nuclei (contrasted with Flugge droplets) photographed by the Tyndall effect. Upper left, sneezing; upper right, pronouncing the letter "p"; lower left and right, pronouncing the letter "t." (Taken from F. Weyrauch and J. Rzymkowski. Photographien zur Tröpfcheninfektion. *Ztschr. f. Hyg. u. Infektionskr.*, 120:444, 1938.)

POLIOMYELITIS AMONG CHILDREN
BY BIRTH ORDER

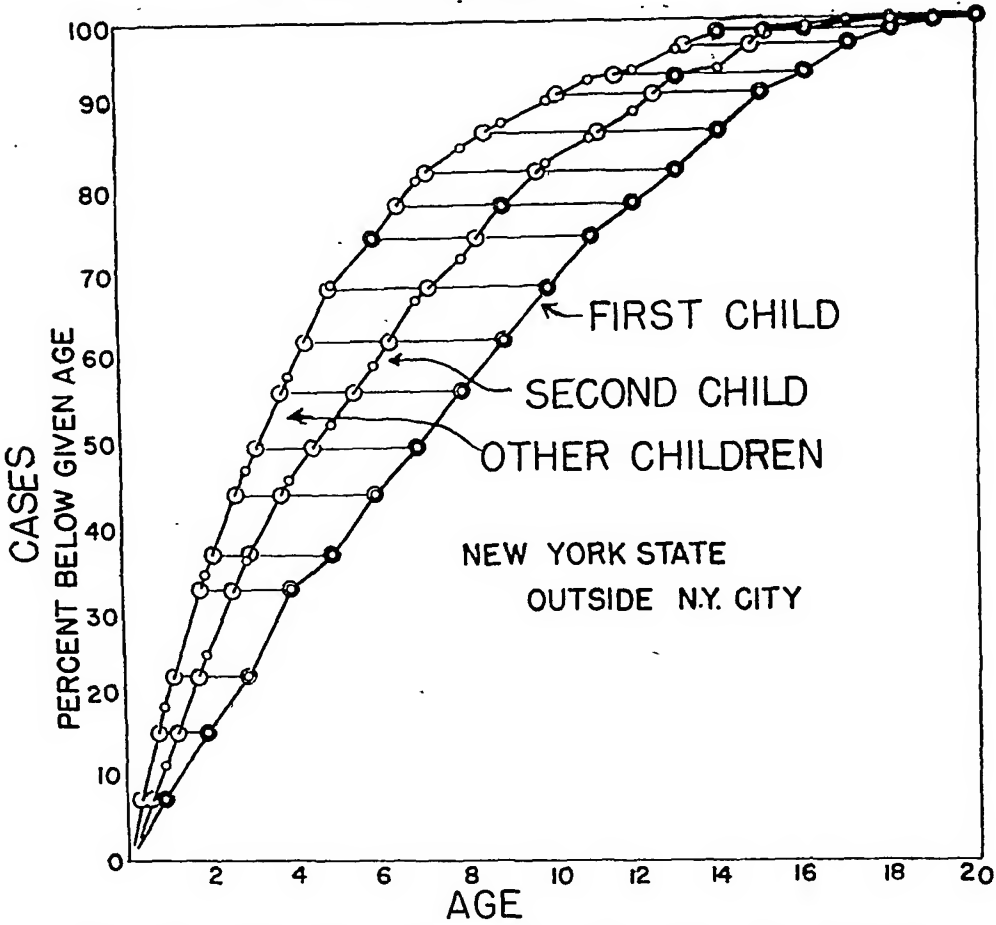


FIGURE III—Age incidence of poliomyelitis by birth order. New York State (exclusive of New York City), 1926–1930. (Data obtained through the courtesy of Dr. E. S. Godfrey.)

study of "Epidemics in Schools" recently issued by the Medical Research Council of Great Britain (Special Report Series No. 227³³) the records over 5 years show an average of 14.2 cases for each contagion* introduced into 26 boarding schools and 3.3 cases for each contagion introduced into 2 day schools. The schools were broadly comparable in size and age-distribution and the probability that these figures reflect differences in exposure-time rather than

differences in numbers or immunity-composition of the subjects is borne out by the familiar studies of Dudley³⁴ on the different attack rates of day and boarding pupils.

Intensity of Infection—Data on the intensity of infection so clearly emphasized by Glover¹⁵ are also provided in the same study. An average of 17.2 cases for each contagion introduced into 17 boarding schools for boys, as against an average of 9.1 cases per introduced contagion in 9 girls' boarding schools (in spite of greater degree of reported immunity among the boys) may indicate the greater congestion in

* The word "contagion" is here used in a restricted sense. It refers to the common childhood contagions: measles, German measles, mumps, chicken pox, whooping cough, scarlet fever and diphtheria.

boys' dormitories than in the girls' houses. In the boys' day school, on the other hand, where conditions for the spread of contagion are more comparable, 2.8 cases as against 3.8 cases in the girls' day school per introduced contagion, probably also indicate greater immunity among the boys.

Could it be that differences in climate and method of ventilating homes in England and New England may help to explain the differences in the secondary attack rates in St. Pancras and in Providence, as observed by Wilson²⁵:

Moreover, Greenwood's data taken from Stocks show secondary attack rates of 25 to 35 per cent with all children under 10 years of age left in whether immune or not and of 45 to 50 per cent with the immunes (those who had had measles) rejected, whereas we find in Providence secondary attack rates on susceptibles under 10 running 75 to 80 per cent, and on all children under 10 from 60 to 65 per cent. Apparently, then, measles is far less infectious under conditions of family life in St. Pancras than in Providence.

Could the conditions which account for one escape in a family so favor other susceptibles as to depress the secondary attack rate as found by Wilson²⁵:

If next we look to the single primary families which have one specified susceptible escape,

we find the secondary attack rate on the other susceptible to be 55.6 ± 4.6 , and thus the presence of an escape lowers the secondary attack rate more than the presence of an immune.

Could the seasonal difference in secondary attack rates in Detroit, as reported by Top,³⁵ also be explained on the basis of greater confinement of children in air more confined from January through April, causing a greater intensity of infection during those months over the preceding and following months, as shown in Table III.

What interrupted the "seasonally interrupted" epidemic in Providence, also referred to by Wilson²⁵:

The course of measles in Providence 1929-1934 was characterized by a low incidence in all years but 1931 and 1932 and a major epidemic in those years. . . . The course in 1931 consisted of a moderate epidemic in the late spring falling to a score of cases in September and a sharp rise to epidemic proportions. For this reason we consider that the behavior of measles in 1931-1932 may properly be characterized as a major epidemic seasonally interrupted rather than as two epidemics, one in the late spring of 1931 followed by another in the fall of 1931 and winter of 1932. Hence we shall speak of 1931 as the first and 1932 as the second part of the great 1931-1932 epidemic which contained about six-sevenths of all the measles in the 6 year period 1929-1934. The ratio of secondary to primary cases changes from year to year by more than can be attributed to chance; it is quite high in 1931 and decidedly low in 1932. The ratio of primaries to families also changes being apparently low in the years in which there is little measles—the difference between the figures for 1931 and for 1930 being not significant.

Multiple Exposures—Such a prevalence of disease as subjects a case to multiple infections in different aggregations complicates the determination of the degree of exposure in any one aggregation. Incidence within an aggregation becomes more truly a measure of susceptibility than of degree of exposure to infection for such diseases as the common cold, where lasting immun-

TABLE III

(Detroit, 1935, Top)

Attack Rates among Susceptible Contacts by Age and Month

Month	Number Contacts	Number Cases	Attack Rates
January	38	33	86.8
February	136	120	88.2
March	589	511	86.8
April	620	532	85.8
May	196	156	79.6
June	45	26	57.8
July	6	..	(0.0)
August	..	..	(...)
September	3	2	(66.7)
Totals	1,633	1,380	84.6

ity is not conferred, where several attacks per person per season may occur, where adults as well as children harbor the infection. Thus Wilder³⁶ observed that, in the Germantown Friends School, the epidemiologic pattern of upper respiratory infections differs from the pattern of childhood contagions. The incidence of colds is remarkably uniform from year to year, and constant for classes and groups of individuals. Our own analysis of Wilder's data convinces us that school exposure does not ordinarily determine incidence of colds within day schools: absences from colds on Wednesday, Thursday, and Friday account for no more than their proportionate share of the weekly incidence. Assuming broad infection spread (i.e., more than one infection per cold), prevention of colds would depend upon the prevention of multiple infections, for not until the last remaining infection was prevented would a cold be avoided. Studies of methods for the prevention of colds will require isolated aggregations, unexposed to a variety of outside sources, where spread within the aggregation can be measured.

DIFFERENTIATION OF EPIDEMIOLOGIC PATTERNS

The demonstration of an epidemiologic pattern of spread of contagion through aggregations sharing common atmospheres, even though consistent with a demonstrated mechanism for interchange of nasopharyngeal organisms in breathing the common air supply, does not of itself necessarily demonstrate air-borne disease. High correlation between the common occupancy of semi-enclosed atmospheres with other opportunities for infection might lead to similar phenomena.

Close association within aggregations sharing a common air supply also facilitates spread of infection by Flüge droplets and contact. Separation of these modes of spread can be made

only on the basis of more refined analysis of the original data than is possible with records studied and reported through the medium of the droplet or contact theories. The degree of proximity in time and space required by these hypotheses will not, however, explain many well established examples of the spread of contagion.

Exclusion of other Modes of Spread—Thus in the classic outbreak of psittacosis in the Hygienic Laboratory, reported by McCoy,³⁷ both droplets and contact could be rigidly eliminated. Stimson³⁸ states:

During the course of the experiments, which had been undertaken with what appeared to be ample precautions, an outbreak occurred among the personnel at the National Institute of Health, involving 11 persons, 1 of whom died. This would seem to indicate an almost incredible diffusibility of the infection through the air, since some of the victims had not been nearer to the rooms in which the animals were kept behind moist curtains, and with troughs of disinfectant at the doorways, than to pass to and occupy rooms in distant parts of the large buildings. This has led to the assumption that the virus may be spread by the "powder down" thrown off by parrots, which seems to have a diffusibility comparable to the pollens.

Seldom in epidemiology can the factors of droplets and contact be so completely eliminated. In experimental work on animals, however, these variables can be controlled. Thus Dunkin and Laidlaw,³⁹ in reporting on the spread of dog distemper through ferret and dog aggregations in which these factors were carefully excluded, state:

Control dogs cannot be kept free from disease in the experimental house, though kept in separate cubicles and the fullest antiseptic precautions maintained by the attendants to avoid carrying infection from one animal to the other. The dogs were not confined in Topley cages, and so the barrier against spread of infection in their case was less perfect; but we are convinced that aerial spread can and does occur in closed buildings, and we have now abandoned experimental work with dogs in confined spaces and work in the open air.

We pointed out that in the case of ferrets there was practically conclusive evidence of air spread of the virus of dog-distemper in confined spaces over short distances. Our experience with dogs is in entire harmony with this conclusion, as we found that it was impossible to keep a control dog in one cubicle of the experimental house when infected dogs inhabited the adjacent cubicles. We were compelled to abandon this method of experiment and substituted a system which is in large measure successful. It consists in keeping the experimental dogs in kennels and small runs scattered about the grounds around the laboratory buildings. Each kennel has a small run enclosed by fencing and wire netting, and is separate from its nearest neighbour by a distance of 15 to 20 yards. We thus rely on dilution by the external air to prevent the spread of infection from one cage kennel to its neighbour. The attendants who attend to the animals wear the rubber armour which has previously been described, and between each visit to a cage kennel have this armour washed down with lysol. All excreta and all food and drinking vessels are disinfected with lysol every day. The dogs are fed on boiled biscuit and boiled horse meat and bones.

Direct infection of the lung by intranasal instillation (under anesthesia) is now a recognized laboratory procedure. Infection through the respiratory tract by dust containing tubercle bacilli has been reported frequently and has become a routine procedure for experimentally infecting rabbits at the Henry Phipps Institute.⁴⁰ Inhalation experiments have also shown that animals can be experimentally infected by breathing air in a chamber which has been sprayed with pathogenic microorganisms.⁴¹

More recently we have devised a technic for infecting animals in air conditioned chambers supplied with air infected with "droplet nuclei" outside of the chamber. No objection can be raised to the conclusion that these were truly air-borne, for they had been carried in the air stream over long distances. The bacterial concentration of the air was quantitatively controlled, and a relationship demonstrated between the quantity of infection so

breathed and the mortality of the animals. Elaboration of this equipment will permit exposures of large numbers of animals over long periods of time to small concentrations of infection and so imitate the conditions of ventilation in our habitations. Experimental ventilation will bridge the bacteriologic deductions in the first part of this paper with the epidemiologic observations considered in the second part.

Determination of Pattern by Ecologic Factors—Exclusion of other than one mode of spread is not necessary to distinguish an epidemic pattern. Plague in warm climates disseminated by rodents, insects, contact, and droplets may become suddenly transformed into a pneumonic or air-borne pattern better explained by droplet nuclei under conditions of crowding within enclosed spaces during cold weather. Thus Strong and Teague,⁴² after showing experimentally that the period of infectivity of pneumonic plague coincides with the coughing phase of the disease in which the air becomes infected, show:

... from the study of human lesions and those produced experimentally in animals it would appear that endemic plague pneumonia results from inhalation, the primary point of infection being the bronchi.⁴³

They further state that

there is a greater tendency for the disease to spread in cold climates than in warm ones.

In harmony with the above ideas, we find that the only great epidemic of pneumonic plague of modern times occurred in Manchuria during the winter of 1910 to 1911, when the atmospheric temperature was many degrees below zero Centigrade. The disease spread with amazing rapidity. Furthermore, although during the past fifteen years there have been millions of plague cases in India and 2 to 5 per cent of these have been cases of plague pneumonia, yet this form of the disease has not assumed epidemic proportions. The largest epidemic of pneumonic plague in India (1,400 deaths) occurred in Kashmir in northern India at an elevation of 1,524 meters above the sea level during very cold weather.⁴⁴

Strong, in 1935,⁴⁵ summarizing his experiences, states:

Thus it was shown that while the germ of primary pneumonic plague is essentially the same as the organism of bubonic plague (with the exception of exhibiting a uniformly great virulence throughout the epidemic), the portal of entry of the microorganism is different from that in bubonic plague; and that in an epidemic of primary pneumonic plague, rats and fleas play no part in the transmission of the disease, the infection occurring directly from man to man by the droplet method of infection in a somewhat similar manner as in influenza. Overcrowding of the inhabitants in midwinter in small huts (sometimes thirty to forty people in one room) with very little ventilation was an important factor in the spread of the disease in Manchuria.

In the spread of respiratory diseases, the recent investigations of Wells and Stone (1934) upon air-borne infections are of interest, in which they point out the importance of dried infected droplet nuclei derived from droplets less than one-tenth of a millimeter in diameter.

Velocity of Spread—Perhaps the most characteristic feature of the air-borne pattern is the velocity of epidemic spread of infection,⁴⁶ implicit in the droplet nuclei hypothesis. The spread of influenza through army barracks during the World War could not, we believe, have been so swift as that described by Opie, Blake, Freeman, Small and Rivers⁴⁷ if it travelled by steps limited in space to the proximity demanded by the droplet or contact theory and separated in time by the necessary incubation period.

The most striking feature of the epidemic was the extremely rapid spread of the infection throughout the camp. Starting September 22 in a regimental area situated in the extreme southwestern corner of the camp, the disease had within 4 days appeared throughout the camp proper, and 4 days later appeared in two outlying encampments, situated respectively 1 mile north and 3 miles east of the main camp.

No single organization escaped the infection, and during the 30 days from September 20, 23.3 per cent of the total population of the camp suffered from the disease. The figures given herewith are based on a detailed study

of 11,725 cases occurring between September 20 and October 14, and comprise practically the whole of the epidemic. . . .

Infection with hemolytic streptococci may spread as an epidemic through the pneumonia wards of a hospital. A single patient with streptococcus pneumonia is a source of grave danger to every patient in the same ward. Superimposed infection with hemolytic streptococci increases the mortality of pneumonia so that it may reach from 50 to 100 per cent of all patients with pneumonia. . . .

There seems little reason to doubt that the incidence of pneumonia and the death rate of that which occurs might be greatly diminished by preventing all overcrowding of new recruits in barracks and by providing hospital facilities in considerable excess of the routine demand.

Hospital epidemics of streptococcus pneumonia will be prevented when medical officers have that dread of the disease—comparable to our dread of puerperal fever—which is inevitable when its characters are accurately understood.

Transition from Contact to Air-borne Pattern—In this sense measles may or may not assume an air-borne pattern. The School Epidemics Committee report³³ states:

It is a remarkable fact that quite a high proportion of outbreaks of infectious disease did not spread at all. . . .

It will be noted that on the average about 30 per cent of all outbreaks among the boys, and about 40 per cent among the girls, were thus curtailed (that is, limited to one case, though girls were more susceptible than boys).

When introduced into a school, measles may or may not spread, quite irrespective of the number of susceptibles in the population, but it is more likely than any other disease to assume epidemic proportions, at any rate among the boys. . . .

We have other examples of measles gaining access to a school early in the term, hanging fire for a few weeks, and then causing a large epidemic.

A study of the figures in this report will reveal the fact that over one-half of the cases of measles resulted from less than one-fifth of the introductions of the contagion, and that over 90 per cent of the cases resulted from less than one-half of the introductions.

Some factor besides the virulence of the virus or the resistance of the host must be involved in these wide differences in the velocity of spread of a disease which is considered so highly contagious.

The transition from a contact to an air-borne pattern of spread following the introduction of independent means of dissemination of the virus through air is described by Stallybrass.¹⁵

In mumps the author has noticed that the disease sometimes progresses slowly in a school until an outbreak of an epidemic catarrh causes much sneezing, coughing, and spluttering. The mumps epidemic now progresses rapidly. The sudden outbreak marks the transition from contagion to droplet infection and not the alteration of the virus. It has repeatedly been noticed that return cases of scarlet fever follow an attack of a cold in the infecting case; a cold not only increases the amount of mucus discharged into the outer world, but also produces sneezing and coughing; it may also determine a relapse of otorrhoea.

Although Stallybrass uses the words "contagion" and "droplet infection" in a sense differing from that used in this paper (showing, in fact, the confusion in terms applied to the mode of spread of nasopharyngeal infection), there can be little doubt that he recognizes a distinction between the contact and air-borne patterns.

SUMMARY AND CONCLUSION

"Measurement of Sanitary Ventilation" described a method of determining the rate of *removal* of microorganisms from semi-confined atmospheres, with special reference to air disinfection by means of ultra-violet light. An example of the practical usefulness of this method is offered by an experimental study and design of isolation cubicles in which ultra-violet light screens replace solid partitions or where a curtain of light is dropped, continuous with an irradiated reservoir or "ceiling" above the eye level into which any solid cubicle partitions project.

The present paper considers methods of determining the rate of *addition* of microorganisms to semi-confined atmospheres in defining the hazards from air infection and means for the avoidance of such infection.

Sanitary interpretation of analyses of some two thousand samples of air supplied to various human aggregations reveals the consistency between deductions from a theory of air-borne infection, based upon bacteriologic experiments, and epidemiologic evidence of the spread of contagions through aggregations sharing a common air supply. Air-borne infection of animals exposed to quantitative dosage in experimental ventilation further reflects this consistency.

Some few outstanding examples are selected to illustrate an epidemic pattern, fogged by the droplet theory, but clear when viewed through the hypothesis of nuclei from the evaporated droplets. Such a pattern of air-borne spread by droplet nuclei accurately describes the epidemic spread of respiratory infection among individuals aggregated within atmospheres in some degree confined, and can be related to the familiar pattern of epidemic spread of intestinal infection through the medium of water, food, or milk.

Both intestinal and respiratory infection are undoubtedly spread *endemically* by intimate personal contact. The simultaneity or swiftness of *epidemic* spread of both, however, can be better explained by common source media. Each describes its own epidemic pattern true to the physical and biological factors which govern the respective media, just as the patterns of both differ from the pattern of insect spread of disease.

Discovery of the vehicles of transmission of ingested intestinal infection led to successful sanitary measures of control. Recognition of a vehicle of contagion may likewise suggest the means

of preventing epidemic respiratory infection.

REFERENCES

1. Wells, W. F., and Wells, M. W. Measurement of Sanitary Ventilation. *A.J.P.H.*, 28:343, 1938.
2. Rosenau, M. J. *Preventive Medicine and Hygiene*. 5th Ed., 1931.
3. Report of Committee on Ventilation and Atmospheric Pollution. Part I. Working Standards. *Year Book, 1937-1938*, p. 81. Supplement *A.J.P.H.*, Feb., 1938.
4. Wells, W. F. Sanitary Ventilation in Wards. *Heat. & Vent.*, 36:26, 1939.
5. Prescott, S. C., and Winslow, C.-E. A. *Elements of Water Bacteriology*. Wiley and Son, New York. 5th Ed., 1931.
6. Report of Sub-Committee on Bacteriological Procedures in Air Analysis. *Year Book, 1936-1937*. Supplement *A.J.P.H.*, Mar., 1937.
7. Pincus, S., and Stern, A. C. A Study of Air Pollution in New York City. *A.J.P.H.*, 27:321, 1937.
8. Blackfan, K. D., and Yaglou, C. P. The Premature Infant. *Am. J. Dis. Child.*, 46:1175, 1933.
9. Long, A. P., McKhann, C. F., and Cheney, L. L. Nosocomial Infections in an Infants' Hospital. Paper read at American Public Health Association, Kansas City, Oct. 26, 1938.
10. Chapple, C. C., and Kenny, A. Limitation of Bacterial Contamination of Air by a New Automatic Incubator for Infants. *Am. J. Dis. Child.*, 57:1058, 1939.
11. Wells, W. F., and Riley, E. C. An Investigation of the Bacterial Contamination of the Air of Textile Mills with Special Reference to the Influence of Artificial Humidification. *J. Indust. Hyg. & Tox.*, 19:513, 1937.
12. Rosenau, M. J. *Preventive Medicine and Hygiene*. 6th Ed., 1935, p. 911.
13. Allison, V. D. Streptococcal Infections. *Lancet*, 1:1067, 1938.
14. Gordon, M. H. Report on a Bacterial Test for Estimating Pollution of Air. Local Government Board, Great Britain. *Annual Report of Medical Officer of Health*, 32:421, 1902-1903.
15. Glover, J. A. Cerebrospinal Fever. *Med. Res. Council, Special Report Series* No. 50, p. 163; Stallybrass, C. O. *The Principles of Epidemiology*, New York, 1931, p. 338.
16. Anderson, H. B. The Consideration of a Possible Role of Windborne (Hay Fever) Pollens in the Dissemination of the Virus of Poliomyelitis. Paper read at the Forty-eighth Annual Meeting of Life Insurance Medical Directors of America, October 28-29, 1937.
17. Huddleson, F., and Hull, T. G. Bacteria of the Air in an Amusement Hall. *A.J.P.H.*, 10:583, 1920.
18. Buchbinder, L., Soloway, M., and Solotrovsky, M. Alpha Hemolytic Streptococci of Air. *A.J.P.H.*, 28:61, 1938.
19. Report of Advisory Committee on Official Water Standards. *Pub. Health Rep.*, v. 40, No. 15, Appendix I, 1925.
20. Wells, W. F. Air-borne Infection. Study II. Droplets and Droplet Nuclei. *Am. J. Hyg.*, 20:611, 1934.
21. Topley, W. W. C., and Wilson, G. S. *The Principles of Bacteriology and Immunity*. 2nd Ed., 1937, p. 967.
22. McKhann, C. F., Steeger, A., and Long, A. P. Hospital Infections. I. A Survey of the Problem. *Am. J. Dis. Child.*, 55:579, 1938.
23. Okell, C. C., and Elliott, S. D. Cross-Infection with Haemolytic Streptococci. *Lancet*, 2:836, 1936; Brown, W. A., and Allison, V. D. Infection of the Air of Scarlet-Fever Wards with Streptococcus Pyogenes. *J. Hyg.*, 37:1, 1937; Allison, V. D., and Brown, W. A. Reinfection as a Cause of Complications and Relapses in Scarlet Fever Wards. *J. Hyg.*, 37:153, 1937; Keevil, N. L., and Camps, F. E. Epidemic Streptococcal Infections in a General Hospital. *Lancet*, 2:207, 1937; Cruickshank, R. In a Symposium on Streptococcal Infection as Ascertained by Type Determination. *Lancet*, 1:841, 1938.
24. Dudley, S. F. Medical Research Council, S.R.S. Nos. 75, 111 and 195; Ayccock, W. L. *Am. J. Hyg.*, 8:35, 1928, and *J. Prev. Med.*, 4:189, 1930.
25. Wilson, E. B., Bennett, C., Allen, M., and Worcester, J. Measles and Scarlet Fever in Providence, R. I., 1929-1934, with respect to Age and Size of Family. *Proc. Am. Phil. Soc.*, 80:357, 1939; Stocks, P., and Karn, M. N. A Study of the Epidemiology of Measles. *Ann. Eugenics*, 3:361, 1928; Greenwood, M. On the Statistical Measure of Infectiousness. *J. Hyg.*, 31:336, 1931.
26. Frost, W. H. The Familial Aggregations of Infectious Diseases. *A.J.P.H.*, 28:7, 1938.
27. Chapin, C. V. Measles in Providence, R. I., 1858-1923. *Am. J. Hyg.*, 5:635, 1925.
28. Dyer, R. E., Caton, W. P., and Sockrider, B. T. Results of Dick Tests Made on Different Groups. *Reprint No. 1086, Pub. Health Rep.*, June 11, 1926; Rist and Weiss. *Ann. de méd.*, 12:356, 1922; Zingher, A. *Arch. Int. Med.*, 20:392, 1917.
29. Opie, E. L., and McPhedran, F. M. The Contagion of Tuberculosis. *Am. Rev. Tuberc.*, 14:347, 1926.
30. Pneumonia: Mortality and Measures for Prevention. Report of Advisory Committee on Prevention of Pneumonia Mortality. Supplement No. 142, *Pub. Health Rep.*, 1938.
31. Wells, W. F., and Wells, M. W. The Velocity of Spread of Nasopharyngeal Infection. Unpublished paper read before Section on Diseases of Children, New York Academy of Medicine, Jan. 13, 1938.
32. Denny, F. P. Diphtheria Bacilli in Healthy Throats, with Report of Cases. *Boston M. & S. J.*, 143:515, 1900.
33. The Schools Epidemics Committee. Epidemics in Schools. *Med. Res. Council, S.R.S. No. 227*, 1938.
34. Dudley, S. F. The Schick Test, Diphtheria and Scarlet Fever. *Med. Res. Council, S.R.S. No. 75*, 1923; and Microbic Dissemination in Schools, *Lancet*, 2:849, 1928.
35. Top, F. H. Measles in Detroit, 1935. I. Factors Influencing the Secondary Attack Rate among Susceptibles at Risk. *A.J.P.H.*, 28:935, 1938.
36. Wilder, T. F. *Childhood Education*, Feb., 1935.
37. McCoy, G. W. Psittacosis among the Personnel of the Hygienic Laboratory. *J. Infect. Dis.*, 55:156, 1934.
38. Stimson, A. M. Bacteriological Investigations of the United States Public Health Service. *Pub. Health Rep.*, Supplement No. 141, 1938, p. 48.
39. Dunkin, G. W., and Laidlaw, P. P. Studies in Dog-distemper. I. Dog-distemper in the Ferret. *J. Comp. Path. & Therap.*, 39:201, 1926. *Ibid.* Studies in Dog-distemper. II. Experimental Distemper in the Dog. *J. Comp. Path. & Therap.*, 39:213, 1926.
40. Lurie, M. B. Experimental Epidemiology of Tuberculosis. I. *J. Exper. Med.*, 51:729, 1930; II. *Ibid.*, 51:743, 1930; III. *Ibid.*, 51:753, 1930.
41. Stillman, E. G. The Presence of Bacteria in the Lungs of Mice following Inhalation. *J. Exper. Med.*, 38:117, 1923. Wherry, W. B., and Butterfield, C. T. Inhalation Experiments on Influenza

and Pneumonia and on the Importance of Spray-borne Bacteria in Respiratory Infections. *Reprint No. 670, Pub. Health Rep.*, 1921.

42. Strong, R. P., and Teague, O. Studies on Pneumonic Plague and Plague Immunization. II. The Method of Transmission of the Infection in Pneumonic Plague and Manner of Spread of the Disease During the Epidemic. *Philippine J. Sci. B. Philippine J. Trop. Med.*, 7:137, 1912.

43. Strong, R. P., Crowell, B. C., and Teague, O. Studies on Pneumonic Plague and Plague Immunization. VII. Pathology. *Ibid.*, 7:203, 1912.

44. Teague, O., and Barber, M. A. Studies on Pneumonic Plague and Plague Immunization. III. Influence of Atmospheric Temperature upon the Spread of Pneumonic Plague. *Ibid.*, 7:157, 1912.

45. Strong, R. P. The Importance of Ecology in Relation to Disease. *Science*, 82:307, 1935.

46. Wells, W. F., and Wells, M. W. Air-borne Infection. *J.A.M.A.*, 107:1698, 1936.

47. Opie, E. L., Freeman, A. W., Blake, F. G., Small, J. C., and Rivers, T. M. Pneumonia Following Influenza (at Camp Pike, Ark.). *J.A.M.A.*, 72:556, 1919.

Public Health Administration Program

TODAY public health administration is questioning every form of disease, physical and mental; its thought is not limited to the modest possibilities of the clinic, the classroom, or the health leaflet or poster; it demands complete medical service and plans widespread popular education in hygiene as a matter of course, but these activities have been reduced to minor rank in a larger and more significant program. Public health administration now aims to control all environmental factors which affect health. The stu-

pendous task which it appears to have set for itself is not quite frankly avowed, but this task, as I apprehend it, is to define and to apply through social administration a physiologically sound standard of living. Public health administration proposes, in effect, a benevolent dictatorship in the name of health, thus applying in a drastic and wholly unexpected form, the familiar saying that the public health is a concern of government.—S. S. Goldwater, M.D., at dedication exercises, Memorial Hospital, New York, June 14, 1939.

Paratyphoid Fever in Massachusetts*

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A SUDDEN increase in paratyphoid fever occurred in Massachusetts in 1937. From a level of about 6 cases per year, the number reported rose to 267 (Table I). Even in the face of the previous low incidence, Massachusetts was one of the last states to continue the use of triple vaccine. In April, 1937, it was finally decided to omit both the paratyphoids but before monovalent vaccine went into distribution the sudden increase in paratyphoid B infections had been observed and it was decided for the time that a bivalent typhoid-paratyphoid B vaccine would be distributed.

The cases reported in 1937 fall readily into five groups. There were 4 food-borne outbreaks, and the remainder were sporadic cases widely scattered throughout the state.

OUTBREAK I: PASTRY-BORNE

The first and largest outbreak began

* Read before the Epidemiology Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 26, 1938.

† The authors, the present and the former Director of the Division, are merely serving as spokesmen for the Division since all of the central office staff and most of the District Health Officers shared in the investigation. Special credit is due to the staff of the Bacteriological Laboratory under Miss E. A. Beckler who handled so creditably the large volume of specimens made necessary by the outbreaks. The department also acknowledges the splendid cooperation of the local boards of health in handling the problems which arose. Dr. Anderson is now Professor of Preventive Medicine and Public Health, University of Minnesota.

early in April, but was not recognized until late in the month. Beginning April 15, several positive and suggestive Widal's were reported on specimens sent in from communities north of Boston. One or two cases seen by the district health officer did not appear to be typical typhoid fever. On April 22 a postmortem culture from a fatal case of supposed typhoid and a stool specimen from a case which had shown a suggestive Widal both showed the presence of paratyphoid B bacilli. All laboratory specimens submitted from the area were scrutinized immediately to discover whether they might not be from unrecognized cases of paratyphoid fever. Inquiries among physicians in the communities brought to light other cases of diarrhea and fever of unknown origin.

An attempt was made to find some common factor among the cases which

TABLE I
*Reported Cases of Paratyphoid in
Massachusetts
1930-1938*

Year	Cases of Paratyphoid A	Cases of Paratyphoid B
1930	0	0
1931	1	5
1932	1*	6
1933	0	10
1934	1	5
1935	0	5
1936	2	5
1937	1	267
1938 (9 mos.)	0	66

* 4 cases not stated

were discovered. They were living in widely separated communities. There had been no large gatherings at which all had been present. Water supplies and milk supplies were numerous. Many of the early cases were among children. This latter point was kept in mind when searching for other common vehicles which might be widely distributed throughout the area. It was found that some gave a history of having eaten jelly rolls. The source was looked up and it was noted that the baker also made cream puffs and a pastry which consisted of two pieces of chocolate cake held together by a thick marshmallow cream. Upon inquiry it was discovered that many of those ill had eaten these other pastries, especially the marshmallow cake. The baker was advised to stop the manufacture of the latter. He had already stopped making cream puffs on March 1.

In searching for the source of the infection all of the food handlers in the

bakery were examined. It was discovered that the man who worked at the wrapping counter and occasionally helped with the filling of the pastry was excreting paratyphoid organisms in his stool. He gave no history of having been ill. After a few positive examinations the organisms disappeared from his stool. It was, therefore, impossible to determine whether he was the cause of the outbreak or whether he himself had picked up the bacilli from the bakery products. Examination of the raw materials which went into the products was undertaken and an organism belonging to the *Salmonella* group was discovered in the powdered egg. It was culturally and immunologically different from those isolated from the stools of patients.

The baker produced large quantities of these inexpensive pastries. They were sold by four delivery men who had routes covering a large number of the cities and towns in the north-eastern part of the state (Table II).

TABLE II
Outbreak 1: Pastry-borne
Distribution of Cases and Products of Bakery

Community	Cases Para B	Number of Stores Supplied				Total Number
		Driver No. 1	Driver No. 2	Driver No. 3	Driver No. 4	
Lynn	25	..	..	..	45	45
Winchester	23	..	..	1	4	5
Lowell	16	72	..	66	4	142
Woburn	13	..	..	3	11	14
Lawrence	12	..	82	..	..	82
Wakefield	9	..	..	..	14	14
Melrose	7	..	..	..	16	16
Stoneham	6	..	..	..	3	3
Methuen	3	..	5	..	..	5
Reading	3	..	..	..	2	2
Billerica	3	..	..	..	10	10
Everett	3	..	..	..	10	10
Saugus	2	..	..	..	9	9
Somerville	2	..	..	18	..	18
Medford	2	..	..	10	6	16
Burlington	1	..	..	3	..	3
Dracut	1	4	..	..	..	4
Malden	1	..	..	..	9	9
Andover	0	..	1	..	..	1
Cambridge	0	..	..	9	..	9
Chelmsford	0	2	..	..	..	2
Haverhill	0	..	23	..	..	23
Tyngsboro	0	1	..	..	..	1
Wilmington	0	..	..	..	4	4
Total	132	79	111	110	147	447

It will be noted that there was one driver who went into 13 out of the 18 communities in which cases occurred. He was, apparently, the most energetic of the delivery men, since he covered more stores than any other, but even so he seemed to have more than his proportion of the cases. In 9 communities where cases occurred, he was the only driver who delivered the products (Table III). His products alone were responsible for 59 cases in contrast to 19 cases chargeable to the products of the other three drivers. This would indicate that the organism was irregularly distributed in the pastries and that the one driver happened to get the most heavily infected products.

TABLE III

Outbreak I: Pastry-borne

Cases Reported in Communities Visited by One Driver Exclusively

Community	Driver No. 1	Driver No. 2	Driver No. 3	Driver No. 4
Lynn	25
Lawrence	..	12	..	..
Wakefield	9
Melrose	7
Stoneham	6
Billerica	3
Everett	3
Methuen	..	3	..	..
Reading	3
Saugus	2
Somerville	2	..
Burlington	1	..
Dracut	1	..	..	..
Malden	1
Andover
Cambridge
Chelmsford
Haverhill
Tyngsboro
Wilmington
Total	1	15	3	59

It is difficult to believe that all of the cases were caused by pastries delivered on a single day. The date of onset of the first case investigated was March 28, but others continued to occur until the last of May (Table IV). Most of the cases had onsets before the investigation of the outbreak began on April 22. As might

TABLE IV

Outbreak I: Pastry-borne

Dates of Onset

Week Ending	No. of Cases
April 3	3
April 10	19
April 17	36
April 24	21
May 1	18
May 8	6
May 15	9
May 22	3
May 29	1
No symptoms	10
Date not determined	6
Total	132

be expected with a pastry product popular among children, the incidence was highest among the lower age groups (Table V).

There was a high degree of laboratory confirmation of the diagnosis. Of the 132 cases, positive stools were found in 116 (88 per cent) and positive or partial agglutination for paratyphoid B was found in 102 (77 per cent). In 86 cases (65 per cent) both the stool and agglutination test confirmed the diagnosis (Table IX).

In the search for additional cases, many family contacts were examined. Including examinations on food handlers, the total number of individuals was 222. Some of these had suspicious symptoms but 10 were found to be harboring the organism without having exhibited any symptoms. These 10 were classed as subclinical cases and were included among the 132 cases recorded for the outbreak.

TABLE V

Outbreak I: Pastry-borne

Distribution of Cases by Age and Sex

Age	Male	Female	Total	Per cent
0-9	18	21	39	29.5
10-19	19	24	43	32.6
20-29	5	21	26	19.8
30-39	6	7	13	9.8
40-49	..	7	7	5.3
50-59	3	1	4	3.0
Total	51	81	132	100.0

Four individuals were operated upon before it was discovered that they had paratyphoid fever.

OUTBREAK II: IN GIRLS' COLLEGE

Before the investigation of the first outbreak was entirely completed, attention was called to a number of cases of diarrhea and fever among students in a college in Boston. Examination of blood and stool specimens demonstrated that the illnesses were due to paratyphoid B bacilli. A search for further cases and for the source of infection was immediately begun.

The college had an enrollment of approximately 1,700 students. The only common factor was that all those ill had eaten at the college cafeteria on either June 2 or June 3 during examination week. In going over the menus of the two days, it was found that chicken salad had been served on June 2 and what was left over was made into chicken salad sandwiches on June 3. Among those ill, chicken salad was remembered as one article eaten in practically every instance.

The cafeteria employed 62 workers of whom 13 were full-time employees. Eight persons took part in preparing the chicken salad. Five of these were ill the next day of what proved to be paratyphoid fever. Two of them assisted in preparing the chicken salad sandwiches. Two others of the 8 showed no symptoms, but paratyphoid B bacilli were present in stool specimens. One of these showed positive stools for over a year afterward. The agglutination test in the latter was suggestive and has remained so. She is the only individual followed whose agglutination titer has failed to decrease. It is probable but it cannot be proved that she assisted in removing the meat from the chickens and in dicing it for the chicken salad. While it cannot be definitely established that she was responsible for the outbreak,

the possibility is very great. It should be noted that the kitchen workers were examined 3 years previously, and she is the only one of the workers employed throughout both periods on whom a record of a stool examination 3 years before cannot be found. Throughout all this period her tasks have consisted largely of washing cooking utensils and preparing raw vegetables for cooking. Attempts to associate any of the kitchen workers with recognized cases in the pastry outbreak or with visits into the area where it occurred were entirely unavailing.

The school had closed before the existence of the outbreak was recognized. An especially urgent problem arose when it was discovered that a number of the students enrolled in home economics courses who had been working in the cafeteria had obtained summer positions as food handlers in cafes, hotels, camps, and other summer resorts. It became necessary to learn the destination of these girls and inform local and state health authorities, as well as prospective employers, that stool specimens should be examined to show that they were not carrying the organism. Some of them, in fact, were found to have positive stools.

It was thought important to inform all of the students and the faculty about the outbreak so that the possibility of being operated upon in the belief that they had appendicitis might be prevented and also in order that they might submit themselves to proper medical supervision if they had developed symptoms after departing from the school. State and local health authorities were also notified so that they might check on any that might be handling food.

Seventy-three individuals were found who had probably been infected by eating at the cafeteria. This certainly does not represent the total number, as other unrecognized cases

undoubtedly must have occurred. However, it is readily understood why a larger proportion of the school was not affected. Since it was examination week, the number served at the cafeteria was smaller than usual. Many took all their meals at home or in other dining rooms connected with the school. Moreover, only those who ate the chicken salad were apparently exposed to infection.

Laboratory confirmation was again quite satisfactory. Out of the total of 73 probable cases, 47 (65 per cent) were confirmed by positive stool cultures, 17 others (23 per cent) by positive or partial agglutination tests, and only 9 were clinical diagnoses (Table IX). Stool specimens were obtained too late to expect to find the organisms in some cases. The agglutination test was not helpful in others because of previous inoculation with triple vaccine. Nine individuals with positive stools gave no history of illness.

The spread of dates of onsets gives some information as to the length of the incubation period. Over 90 per cent became ill in 10 days or less, and over 50 per cent had onsets on the 6th,

7th, and 8th days (Table VI). Some had a mild diarrhea on the first or second day and more severe symptoms, including fever, three or four days later.

OUTBREAK III: IN BOYS' SCHOOL

The third outbreak occurred among students and visitors who ate at one or both of two meals served on June 8 during the closing exercises of a boys' private school in the western part of the state a hundred miles from the two previous outbreaks. Both of the meals were prepared by the regular kitchen staff and served by the boys of the school. A large number of those served were relatives and friends of the boys. The menus were very similar and much of the food for the two meals came from the same large containers. Chicken salad, potato salad, turkey dressing, and ice cream were the articles which came under suspicion.

Examination of the food handlers of the school and of the ice cream company failed to reveal a single individual who gave a history of having been ill previous to the outbreak or who showed a positive stool or agglutination test for paratyphoid B.

There was no way of obtaining a complete list of the individuals who had attended the exercises. It was estimated that more than 1,000 may have been exposed. The students had already left school when the investigation began, dispersing to all parts of the United States. Some of them were already on board ship bound for Europe.

Notices were sent to all registered students calling their attention to the possibility of their having been exposed to the infection and recommending that they place themselves under the care of a physician if they had shown any symptoms. They were also warned that those with subclinical infections might convey the disease to

TABLE VI
Outbreak II: In Girl's College
Dates of Onset

<i>Date</i>	<i>No. of Cases</i>
June 3	2
4	2
5	2
6	4
7	3
8	8
9	10
10	10
11	1
12	4
13	0
14	0
15	0
16	1
17	0
18	1
19	1
No Symptoms	9

TABLE VII
Outbreak III: In Boys' School
Dates of Onset

<i>Date</i>	<i>No. of Cases</i>
June 9	2
10	40
11	72
12	7
13	1
14	1
15	0
16	3
17	1
18	1
Unknown	2
No symptoms	1

their contacts. State and local health officers were notified of the home addresses of the students.

The number found who had shown symptoms leading to the suspicion of a paratyphoid infection eventually totaled 130. Of this number, 12 had positive stools, 30 others showed positive or suggestive agglutination tests for paratyphoid B, 63 either negative stools or agglutination tests or both, and no specimens were obtained on 25 individuals (Table IX). While laboratory evidence of paratyphoid B infection was obtained in only 30 per cent of the cases, the fact that most of those ill showed onsets within 48 hours after the meals were served would indicate that they contracted their infection at the school (Table VII). That the illnesses were something more than so-

TABLE VIII
Outbreak III: In Boys' School
Duration of Symptoms

<i>Days</i>	<i>No. of Cases</i>
1	7
2	9
3	18
4	20
5	18
6	3
7	7
8	2
9	0
10	0
11	1
12	0
13	0
14	2

called "intestinal grippe" is suggested by the duration of symptoms which averaged approximately 4 days (Table VIII).

Either stools or blood samples were examined from 75 other individuals who showed no symptoms. Some of these were the food handlers mentioned above. One individual, a student, was found to have a positive stool and 4 individuals were found to have suggestive agglutination tests. These 4 gave a history of having received typhoid-paratyphoid vaccine inoculations.

OUTBREAK IV: CHRISTENING PARTY

The fourth outbreak was a small one which occurred after a christening party on August 15 held in a town near Springfield. This town was thirty miles from the school in which the third outbreak occurred and a hundred miles from the other two. Twenty-nine individuals were probably exposed either by eating at the party or by consuming food which had been prepared for the occasion. Among those exposed, 13 are known to have shown symptoms, of whom 5 had positive stools, 3 others showed positive or suggestive agglutination tests and 5 showed negative tests (Table IX).

In searching for the source of the infection, it was noted the illnesses were limited almost entirely to visitors in the home of the christened child where the party had been held. The father of the child had been ill 10 days before the outbreak. His symptoms, consisting of vomiting and diarrhea, and lasting 5 days, were of sufficient severity that he had gone to a nearby hospital where he was told that he had colitis, but no stool specimens were cultured there. Paratyphoid bacilli were not found in his stool at the time of the investigation, so it is impossible to show that he was responsible for the outbreak, particularly since he had taken no part in pre-

TABLE IX

Summary of Laboratory Confirmation of Cases of Paratyphoid B

	<i>Probable Cases</i>	<i>Positive * Stools</i>	<i>Positive Agglutination</i>	<i>Negative Examinations</i>	<i>No Examinations</i>
Outbreak 1	132	116	16	0	0
Outbreak 2	73	47	17	6	3
Outbreak 3	131	13	30	63	25
Outbreak 4	13	5	3	5	0
Sporadic, 1937	47	38	3	6	0
Total for 1937	396	219	69	80	28

* Many of these also showed positive agglutination tests.

paring the food except for assisting in making pickles. A 4 year old boy was the only member of the household to become ill after the party. All laboratory tests on specimens from members of the family were negative.

DISCUSSION

It has been impossible to trace any connection between these outbreaks. People infected in the first outbreak may have carried the organism to many other parts of the state, but so far no such individuals have been found. The fact that 20 with positive stools and 11 others with positive agglutina-

tion tests were entirely without symptoms emphasizes the importance of sub-clinical infections in this disease and illustrates why its control may be difficult. One of the fundamentals of such control is the ability to recognize cases. When missed cases occur, difficulties increase.

The persistence of the organism in the stools of convalescents adds an additional problem. It will be noted that almost half of those who showed positive stools were still carrying the organism at the end of 5 weeks, one-eighth at the end of 9 weeks (Table X). Others continued positive until

TABLE X

Persistence of Positive Stools

Week Last Positive Stool Found							Cases Still Positive Each Week	
Week	Outbreaks				Sporadic Cases	Total	Number	Per cent
	1	2	3	4				
1	1	0	0	0	0	1	205	100.0
2	8	5	3	1	4	21	204	99.5
3	23	14	4	2	6	49	183	89.3
4	20	4	2	0	8	34	134	65.4
5	16	6	1	1	2	26	100	48.8
6	10	6	0	0	6	22	74	36.1
7	13	2	1	0	3	19	52	25.4
8	7	0	0	0	0	7	33	16.1
9	6	2	0	0	2	10	26	12.7
10	3	0	0	0	0	3	16	7.8
11	0	0	0	0	0	0	13	6.3
12	1	0	0	0	0	1	13	6.3
13	0	0	0	0	0	0	12	5.8
14	1	0	0	0	0	1	12	5.8
15	1	0	0	0	0	1	11	5.4
16	0	0	1	0	0	1	10	4.9
20	0	0	0	0	1	1	9	4.4
28	1	0	0	0	0	1	8	3.9
32	1	0	0	0	0	1	7	3.4
49	0	1	0	0	0	1	6	2.9
52+	4	0	0	0	1	5	5	2.4
Total	116	40	12	4	33	205		

the 28th, 32nd, and 49th weeks, and 5 permanent carriers have been added to our list.

Indications are that the disease will continue in the state for some time. During 1937, 47 sporadic cases were discovered in various parts of the state, practically all of them occurring subsequent to the outbreaks. In the first 9 months of 1938, 66 cases have been reported. Six small outbreaks, totalling 48 cases, occurred in families or in groups eating a common meal. The other 18 were sporadic cases.

SUMMARY

1. There was a marked increase in the incidence of paratyphoid fever in Massachusetts in 1937.

2. Of 267 reported cases, 220 were associated with four outbreaks and the other 47 were sporadic cases.

3. The vehicle carrying the infection was

discovered in two outbreaks (pastry in one, chicken salad in the other), and suspected (chicken salad) in a third.

4. Individuals handling food were found with positive stools in two outbreaks. It could not be definitely proved that they were the source.

5. There were 396 individuals suspected of having paratyphoid B infections: 219 were found to have positive stools, 72 others showed positive or suggestive agglutination tests but negative stools, and 105 were unconfirmed by laboratory examinations.

6. Four individuals were operated upon for appendicitis before the outbreaks were discovered.

7. Five cases have continued for 12 months to excrete paratyphoid B bacilli and have been placed on the carrier list. This is a rate of about 2 per cent permanent carriers, which corresponds to the rate observed for typhoid fever in Massachusetts.

8. Attention is called to the importance of subclinical infections in the control of the disease.

9. Paratyphoid B fever has apparently become established in Massachusetts; 66 cases have already been reported in 1938.

Relation of the Coroner's Office to the Bureau of Vital Statistics*

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THE relation between the coroner's office and the bureau of vital statistics has become, in recent years, a problem of vital concern to both groups. Their functions so overlap that each has become more or less dependent on the other for a necessary portion of its work. Because of this it is not only desirable but mandatory that a harmonious reciprocal relationship shall exist between the two offices. This may result only when a meticulous, businesslike attitude prevails in regard to the duties of each office, particularly as to the overlapping functions; when competent, properly trained individuals are employed in both departments, and when resentment ceases against the expenditure of a small amount of extra effort, when occasion demands.

DUTIES OF THE CORONER

It first must be emphasized that the function of the coroner is a vital one. It is one of the least recognized and considered the least important of public offices; yet, sometimes its function far surpasses that of other public offices in importance. For this reason and because its major function has a bearing on the duties of the bureau of vital statistics, its importance cannot

be overemphasized. The office investigates and establishes the causes of certain types of death and the circumstances as defined by state law. This varies somewhat from state to state but, on the whole, there is general agreement. This process, depending upon the incumbent, can be a short, cut and dried, superficial procedure, or a thorough investigation, employing all the armamentarium of science to reach a truthful conclusion. The highest type of procedure of this nature is exemplified by the Medical Examiner's System of New York City. In Cleveland, we pride ourselves on the fact that we are following essentially the same procedure with a fair measure of success, in so far as the state law permits.

Unless all the tools of science—the laboratories of chemistry, pathology, bacteriology, immunology, and ballistics, together with all the evidence derived from the examination of witnesses—are available to the coroner (or medical examiner) he is hampered in his investigation. Having these, the performance of tests and the securing of necessary evidence enables the coroner to make an exhaustive and accurate analysis and to reach his decision sooner. It cannot be too much emphasized that the accuracy of the coroner's verdict varies directly with the accuracy and completeness of his investigation, and similarly affects the statis-

* Read at a Joint Session of the American Association of State Registration Executives and the Vital Statistics Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 26, 1938.

tical survey or record of the bureau of vital statistics.

It may be well to point out that not a small part of the statistical information regarding deaths is transmitted from the coroner's office to the bureau of vital statistics. Assuming our experience in the County of Cuyahoga to be representative of the country as a whole, about 12-15 per cent of the deaths in the county are handled by the office of the coroner.

To emphasize the necessity for complete and accurate investigation, many cases can be mentioned where individuals met death as the result of foul play, the true nature of the case being hidden by a series of circumstances in superficial and incomplete investigations. These have been cleared up and the guilty persons brought to justice only through the employment of the laboratory aids mentioned. Conversely, cases are on record where deaths have occurred under highly suspicious circumstances and where innocent individuals have had their lives or liberty placed in jeopardy until the true state of affairs was revealed by these very laboratory aids. Though primarily for the purpose of the coroner's function and record, the accuracy of the investigation affects equally, though secondarily, the work of the bureau of vital statistics.

A function of the coroner's office that is more obviously related to the function of the bureau of vital statistics is the filling out and turning over of the completed certificate of death as soon as possible. I must stress the importance of having a liberal coöperative individual in charge of the local bureau of vital statistics who can understand that on occasion much time may elapse before chemical, bacteriological, pathological, and immunological procedures can be carried out, and as a result the report with the cause of death must be deferred. This may be

irksome, entail more work, and cause some delay in the functions of the bureau of vital statistics, but for the sake of the truth, these handicaps must be accepted gracefully. I have learned that this very act may often be the source of friction between the offices in various parts of the country. Delays of several months to a year have occurred. This to me seems entirely unnecessary except on possible rare occasions.

We have established a working relationship with the Bureau of Vital Statistics which I consider ideal and practical. Probably there is nothing original in it, and parts may be in force in various coroners' offices throughout the country; yet I hope it is of sufficient value to bear explaining.

The majority of our cases are settled conclusively by the Coroner's investigation and/or the gross pathological examination. As the result, the cause of death can be arrived at in very short order, the death certificate filled out, and the information made available to the Bureau of Vital Statistics, within a few up to 24 hours. Should subsequent, more minute histological or chemical examination reveal such additional evidence as to cause a change in the recorded cause of death, this is made in our records and the information is also conveyed to the Bureau of Vital Statistics. Though this entails some trouble, it rarely occurs and is preferable to waiting over a longer period (7 to 10 days) for the final report.

In those few cases, in which there is suspicion or doubt and the Coroner's report is thereby incomplete, the death certificate is filled out with the exception of the cause of death, which is marked "Deferred." Where burial must take place prior to the completion of the Coroner's verdict, the registrar coöperates by issuing a temporary burial permit with our release of the body so as not to inconvenience the

family and undertaker unnecessarily. These cases are usually completed at the end of 1 or 2 weeks, rarely as long as 3 weeks, and the case is closed, statistically speaking.

The personality of the head of each office is important. Naturally, if either or both individuals are short-tempered, impatient, intolerant, and petulant, questions and complaints may arise, which result in ill-will, lack of coöperation, and clash of temperaments, which in turn may produce more irritation thereby setting up a vicious circle of non-coöperation. Personal contact between the heads of the two departments, particularly when questions or criticisms arise, tend to prevent ill-feeling and promote good will.

With the conclusion of his verdict, there may be a tendency on the part of a coroner to consider his official duties as completed and his responsibility to the bureau of vital statistics as over when he fills out the death certificate and hands it over.

Our office does not rest with that and this is probably the secret of the excellent relationship between the two offices in Cleveland. Not only for our own records, which we strive to keep as complete and accurate as possible for statistical investigation or scientific information, but also for the sake of the data necessary for the local bureau of vital statistics, we secure all possible facts pertaining to the cases. Naturally, where human effort is involved, machine-like precision and accuracy are impossible and errors may and do occur. These errors we check and correct as rapidly as possible. In addition (and very important), we have developed an "esprit de corps," whereby when a request comes from the Bureau of Vital Statistics the information is immediately secured though we may not be directly responsible for that particular bit.

This coöperation and failure to draw

a sharp line of demarcation where our functions end and those of the Bureau of Vital Statistics begin is one of the reasons for excellent relationship between the offices.

We have found that certain errors occur more frequently than others on the certificates of death, and that these are a source of irritation and additional trouble to the Bureau of Vital Statistics. The data most often lacking or inaccurately supplied pertain to "Place of Death," "Classification" and "Place of Residence." Many contradictions in the certificate also occur. These errors can and should be avoided by having a qualified individual perform this service personally, or appointing one of the staff to check the facts.

One important source of irritation is the question of legibility. Most physicians fill out their certificates of death with pen and ink, and very frequently the writing is illegible. The typewriter is more satisfactory, but multiple erasures, crowding of words, or typing over words or letters make such a certificate as bad as one illegibly handwritten.

FUNCTIONS OF THE BUREAU OF VITAL STATISTICS

Since we are concerned solely with cases of death that come under our jurisdiction, I shall limit myself entirely to that portion of its work that concerns itself solely with the collection of mortality statistics.

The Director of the Census considers a 90 per cent accuracy in the vital statistics of mortality in any one locality a satisfactory minimum, yet the percentage of error permitted statistically is extremely large. I would assume the purpose of the present activity and effort is directed toward a greater accuracy and facilitation of activity. In some areas, accuracy is greater than others. It would appear that tendency toward error would be

greater where specialization is less, as in the smaller towns, townships, and villages, where the local clerk acts as registrar of vital statistics and in any other capacity necessary. It follows that his expertness in some must suffer.

That there is a definite need that those employed in the bureau of vital statistics be specially trained and educated in medical matters can be well shown by daily practices. First, simple errors in filling in the necessary data, or contradictions, frequently appear in certificates of death, and it requires knowledge and patience to ferret out these mistakes. Occasionally, causes of death are given, either by design or ignorance, that are vaguely or incorrectly stated, and the registrar or clerk must be on the alert for these errors, especially when there is an attempt to "cover up" a suspicious death.

Perhaps the most important and serious function of the bureau of vital statistics as far as the function of the coroner's office is concerned, is the noting of those certificates signed by private physicians, in cases that should have been investigated by the coroner. In this one function, all the faculties of specialized knowledge and education on the part of the clerk must be uncovered in order to prevent such illegal procedure and assist the coroner in the fulfillment of his duty to society.

Criticism of the coroner's office and of the bureau of vital statistics occasionally occurs, and if offered and met with a fine corrective and coöperative spirit, results in improved relationships, and this eventuates in the desired end of accurate knowledge of statistical data. Such a relationship exists between our office in Cuyahoga County and the Bureau of Vital Statistics of Cleveland, Ohio. Occasionally, errors have occurred, and these chiefly in some of the smaller townships and villages where the personnel in office are not specifically trained.

Occasionally the interpretation of the definition of "Coroner's Cases" comes to the attention of the Bureau of Vital Statistics in connection with the question of who shall sign the certificate of death. This concept varies somewhat from state to state, but the interpretation should be liberal in favor of the coroner. The reason for this lies in the premise that it is better to take no unnecessary chances in questionable cases and allow the matter to be settled by the coroner. Usually this can be settled either by a telephone conversation with a presentation of the facts or a brief police investigation. If the coroner presents a certificate of death in any case, his should be accepted in preference to one presented by a private physician. In making such a statement, I assume that no extra fee is made available to the coroner by such effort, so that no selfish interests motivate him.

SUGGESTED IMPROVEMENTS

A study of this type cannot be considered complete without some suggestions for improvement in the relation between the two offices or in the function of each. One such suggestion, in order to prevent passing "Coroner's Cases" signed by private physicians, is to supply the coroner's office with a duplicate copy of death certificates filed each day. This would entail extra work, but it could be limited to the smaller localities, and particularly to those where there is no medical officer in direct charge of the bureau of vital statistics. The expense and trouble would be repaid by the results. It would also cause extra work on the part of the coroner, but he should not protest, since he would be the one to benefit.

The certificate of death used in coroner's cases, is the same as that used in any other case. When a death becomes a coroner's case certain data are

necessary that distinguish it from others, though no room is available for these specialized data on the regular death certificate. These data are of a type suitable for statistical handling, and much statistical knowledge could be drawn from them. Dr. Halbert L. Dunn, has proposed several supplementary forms for fatal traffic accidents. That is an excellent start. Similar specialized forms should be made available for all the other types of cases that come under the jurisdiction of the coroner, including all homicides, other types of accidents, suicides, and the like. Final analysis of the data secured should prove exceedingly interesting and valuable.

In certain areas, confusion exists between the two offices, chiefly in those localities where there are more than one coroner for a given area. Such a

set-up allows confusion because of the tendency to pass responsibility and blame. This can only be improved by altering the system so that there may be a central office of responsibility.

After securing the proper assistance and equipment, an attempt should be made to function in an ideal manner, for which I can suggest no better model than the Medical Examiner's Office, as it now functions in New York City.

CONCLUSION

I have suggested an outline for the ideal functioning of the offices of the coroner and the bureau of vital statistics, and for ideal coöperation between the two offices. Suggestions are made for the improvement of certain functions, for the betterment of relationships and for greater accuracy of statistical data.

Analysis of the Subsequent Course of Diagnosed Cases of Tuberculosis*

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THE use of life table procedure in studying morbidity and mortality of those in familial contact with tuberculosis¹ was discussed before the Epidemiology Section of the American Public Health Association by Frost in 1932. Since that time the method has been applied to material in the field of tuberculosis by many of his students. Dr. Frost was also especially interested in the extension of the life table procedure to the study of the course of the disease, which necessitated the development of a method of handling the information regarding the cases as to death (from all causes) retrogression, or improvement of the patients. His intense interest in this analysis was in large part responsible for the development of the method presented here.

The death and survival rates of cases of tuberculosis were summarized by Brieger² in 1937, and the expectation of survival in pulmonary tuberculosis has been shown for cases at the Brompton Hospital.³ In many of these studies the status of cases (living or dead) at certain time intervals after admission to, or discharge from sanatoria was known. For cases found in

this study, however, the periods of continued observation vary, and from the standpoint of development of a better control program it seems important to study the changes in status of tuberculosis cases currently. In the analysis of such clinical data it is necessary to assemble the observations in a form which takes account of the time during which each case remained under observation. For such accounting some modification of the conventional life table is the most convenient method to use.

The procedure followed in calculating the mortality experience will be discussed first. The death rate which it is desired to obtain is the rate known in life tables as the "probability of death" (q_x) within a year.

This is expressed by the ratio $q_x = \frac{d_x}{l_x}$

where l_x is the number present at the beginning of the year and d_x is the number of those who died within the year. This statement, however, assumes that all those not known to have died within the year can be known to have survived through the year. In the data available, some of the cases were under observation less than a full year while others moved from the county so that the period of observation terminated within a year after

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first observation. Thus a certain number (w_x) of those who entered the experience (l_x) were withdrawn from the experience during the year. Each of the persons thus withdrawn is counted as having been exposed to (and survived) $\frac{1}{2}$ year's experience so that the number at risk for the whole year is taken as

$$l_x - \frac{1}{2}w_x \text{ and } q_x = \frac{d_x}{l_x - \frac{1}{2}w_x}.$$

The probability of survival can be obtained by subtraction of the probability of death (q_x) from 1, as $p_x = 1 - q_x$. If $100q_x$ is the percentage dying during a year, $100p_x$ is the percentage surviving through the year.

From the percentages surviving each year the percentage of those originally at risk who survived h years can be obtained. Thus, since $100p_x$ survive the first year and $100p_{x+1}$ of these survive through the second year, the proportion of the original number who survive through 2 years (100_2p_x) is equal to $100(p_x \times p_{x+1})$. The risk of dying within the first h years (100_hq_x) is $100(1 - {}_hp_x)$.

To illustrate the method, the mortality of cases of moderately advanced tuberculosis during the 4 years following diagnosis is shown in Table I.

Of the 86 persons entering into this experience (l_x) 20 were withdrawn (living) from the experience during the first year (w_x) and 11 died during the first year (d_x). The number at risk was

$$86 - \frac{20}{2} = 76 \text{ and the death}$$

$$\text{rate per 100 was } 100 \times \frac{11}{76} = 14.5 \text{ per}$$

cent. In column 6 the percentage surviving each year is given and it is seen that 85.5 per cent survived the first year. Since 85.5 per cent survived the first year and 93.9 per cent of those

entering the experience in the second year survived through the year, the proportion of the original number who survived through 2 years was $100(.855 \times .939) = 80.3$ per cent. Similarly, the proportion of the original number who survived through 3 years was $100(.855 \times .939 \times .840) = 67.5$ per cent, and through 4 years 59.1 per cent. From these percentages of those originally at risk surviving through the preceding and current year the percentages dying can be obtained, as $100_hq_x = 100(1 - {}_hp_x)$. The risk of dying in the 4 years was 40.9 per cent.

In addition to mortality rates, the experience in regard to other changes in clinical status can be obtained from these observations. In analyzing the data it is necessary (1) to discuss the number of cases that retrogressed or improved among *survivors*, and (2) to base the changes on the number of people *examined*, as changes other than death are found only by examination. The number of survivors examined in a given year varies with the frequency of examination of the cases in the different clinical groups. Some of the cases were not reexamined until the second year following diagnosis. It is not assumed that the changes are recorded for the period in which they occurred but rather for the period in which they were discovered by a subsequent examination. As death is considered the most important observation during a year it is given precedence over any other possible change.

The percentages of retrogressed and improved cases are based on the survivors of a given year who were examined.

As the numbers of survivors through succeeding years can be obtained from the mortality experience, it remains to relate the changes among the persons examined to all survivors. To do this it is assumed that all survivors retrogress or improve at the same rate as

TABLE I

Mortality of Cases of Moderately Advanced Tuberculosis During 4 Years Following Diagnosis

	Number Present at Beginning of Year	Number Withdrawn (Living) During Year	Number Dying During Year	Average Number at Risk During Year	Percentage Dying During Year	Percentage Surviving Through Year	Percentage Surviving Through Preceding and Current Year	Percentage Dying in Preceding and Current Year
	l_x	w_x	d_x	$l_x - \frac{1}{2}w_x$	$100q_x$	$100p_x$	$100\lambda p_x$	$100\lambda q_x$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1st year	86	20	11	76.0	14.5	85.5	85.5	14.5
2nd year	55	11	3	49.5	6.1	93.9	80.3	19.7
3rd year	41	7	6	37.5	16.0	84.0	67.5	32.5
4th year	28	8	3	24.0	12.5	87.5	59.1	40.9

those examined. The effect of this assumption may slightly exaggerate the retrogression rates and minimize the improvement rates since those individuals who were reexamined may have included a higher proportion of those retrogressing than of those improving. However, it is not felt that this factor is of such significance as to invalidate any of the results obtained. Although all cases are included in the mortality experience until death or the end of observation, they are included in this experience only until retrogression or improvement is recorded; thus, those at risk for retrogression and improvement do not include all those at risk for death and an adjustment is made to account for deaths among those already retrogressed or improved. To prevent overcounting of those eliminated from the experience, the assumption is made that the mortality in the whole group is the same regardless of any changes in classification. Such an assumption may result in an overcounting in deaths among those who improved and an undercounting among those who retrogressed.

The procedure followed in obtaining the status of tuberculosis cases classed as moderately advanced on initial examination is shown in detail in Table II. Three types of changes are noted: death, retrogression to far advanced disease, and improvement by arrest of the disease or by change in extent so that the classification was changed

to one indicating a less extensive lesion. As the mortality experience was given in Table I it is necessary now to relate the percentages showing retrogression or improvement among those examined to the survivors. In the first five columns of the table the actual findings of the survivors who were examined are given. For instance, in the first year, of the 32 survivors examined, 5 retrogressed to far advanced disease (15.6 per cent), and 2 improved so that the clinical classification was altered (6.2 per cent). In the second year, of the 25 survivors examined who had not already retrogressed or improved, 4 retrogressed (16.0 per cent) and 4 improved (16.0 per cent). As the time period after diagnosis increased the number of survivors examined became smaller, since many of the cases were eliminated by retrogression or improvement.

In columns 6-11 inclusive of Table I the survivors are discussed on the basis of 100 or in terms of percentages. The percentage surviving through the preceding and current year, column 7 of Table I, is repeated in column 6. Of the survivors only those who had not improved or retrogressed in a previous interval were at risk for change and these percentages are given in column 7. To obtain the number of survivors who retrogressed on the basis of 100 it is necessary to apply the percentage of retrogressions among examined survivors (col. 3) to all sur-

TABLE II

Status of Cases of Moderately Advanced Tuberculosis for 4 Years Following Diagnosis

	Survivors Examined					Survivors—Basis of 100					Status at End of Each Year Cumulative—Basis of 100				
	Retrogressed			Improved											
	Total No.	Number	Per cent	Number	Per cent	Through Preceding and Current Year	At Risk for Retrogression or Improvement	Retrogressed Each Year	Improved Each Year	Deaths Among Retrogressed	Deaths Among Improved	Dead (All Causes)	Retrogressed	Improved	Unchanged
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1st year	32	5	15.6	2	6.2	85.5	85.5	13.3	5.3	...	...	14.5	13.3	5.3	66.9
2nd year	25	4	16.0	4	16.0	80.3	62.8	10.0	10.0	0.8	0.3	19.7	22.5	15.0	42.8
3rd year	11	3	27.3	2	18.2	67.5	36.0	9.8	6.6	3.6	2.4	32.5	28.7	19.2	19.6
4th year	3	0	...	1	33.3	59.1	17.2	...	5.7	3.6	2.4	40.9	25.1	22.5	11.5

vivors at risk (col. 7) making the assumption that all survivors retrogress at the same rate as the examined ones. For the first year the number at risk was equal to the number who survived (85.5 per cent); the number who retrogressed was 13.3 per cent ($85.5 \times .156$); and the number who improved, 5.3 per cent ($85.5 \times .062$). While 80.3 per cent of the original 100 survived 2 years, 18.6 per cent improved or retrogressed during the first year. Theoretically, a certain percentage of those who retrogressed or improved in the first year were counted among the deaths in the second year and since death takes precedence over other changes an adjustment was made of 1.1 as the number of deaths on the basis of 100 expected during the second year among those who retrogressed and improved in the first year. This number was obtained by applying the death rate in the moderately advanced for the second year (col. 5 of Table I) to the numbers who retrogressed and improved (col. 8 and 9 of Table II). For example, for the second year the number of deaths on the basis of 100 among those who had retrogressed was 0.8 ($.061 \times 13.3 = 0.8$). In all, there were $80.3 - (13.3 - 0.8) - (5.3 - 0.3)$ or 62.8 per cent who were at risk for change in the second year. Of those

in the experience 10.0 per cent retrogressed ($62.8 \times .160$) and 10.0 per cent improved ($62.8 \times .160$) during the second year.

In the last four columns of the table the results of this analysis are summarized to show the changes over a 4 year period of 100 persons entering into the experience. The percentages of those at risk who were dead from all causes by the end of each succeeding year following diagnosis are repeated in column 12. In column 13 are given the proportions of the original number who retrogressed by the end of each year. These percentages are obtained by totalling the number who retrogressed (col. 8) and subtracting the theoretical number of deaths among them (col. 10). For example, by the end of the second year 23.3 per cent had retrogressed, but 0.8 per cent was subtracted for deaths leaving 22.5 per cent of this group who retrogressed and survived. By the end of the fourth year 25.1 per cent had retrogressed. The percentages of those entering this experience who improved (col. 14) are found in a similar way, and by the end of the fourth year 22.5 per cent had improved. Cases who had neither retrogressed nor improved were considered "unchanged" (col. 15).

This method has been applied to

the data collected in the Williamson County Tuberculosis Study. As this present paper is primarily concerned with a statistical method of analysis of clinical data, you are referred to a paper⁴ in the November issue of the *American Journal of Hygiene* for a more detailed description of the material. However, the course of the disease in far advanced, moderately advanced, and minimal cases in white and colored population groups is shown in the two graphs. The difference in the course of the disease according to the extent of lesion on diagnosis is apparent. The status of cases of tuberculosis in the white population is shown in Figure I. Of those far advanced on diagnosis 73.1 per cent died within the 4 years, and 12.0 per cent improved during the same period. The percentage of those with moderately advanced tuberculosis dying within the

4 years following diagnosis (40.9 per cent) was much lower. However, with the addition of 25.1 per cent of the moderately advanced cases who retrogressed to far advanced condition it is seen that the course of the disease was unfavorable. Of those with minimal tuberculosis 61.4 per cent improved, 19.5 per cent retrogressed, and 0.9 per cent died during this period.

The course of the disease was more rapid for the colored cases as is shown in Figure II. Of the far advanced colored cases, nearly half (48.4 per cent) were dead within 3 months after diagnosis, 79.6 per cent were dead by the end of the first year, and 87.8 per cent by the end of the second year. The percentage of those with moderately advanced tuberculosis dying within 2 years was 63.1. No improvements were recorded for far advanced or moderately advanced colored cases.

FIGURE I

STATUS OF CASES OF TUBERCULOSIS FOR FOUR YEARS FOLLOWING DIAGNOSIS
WHITE

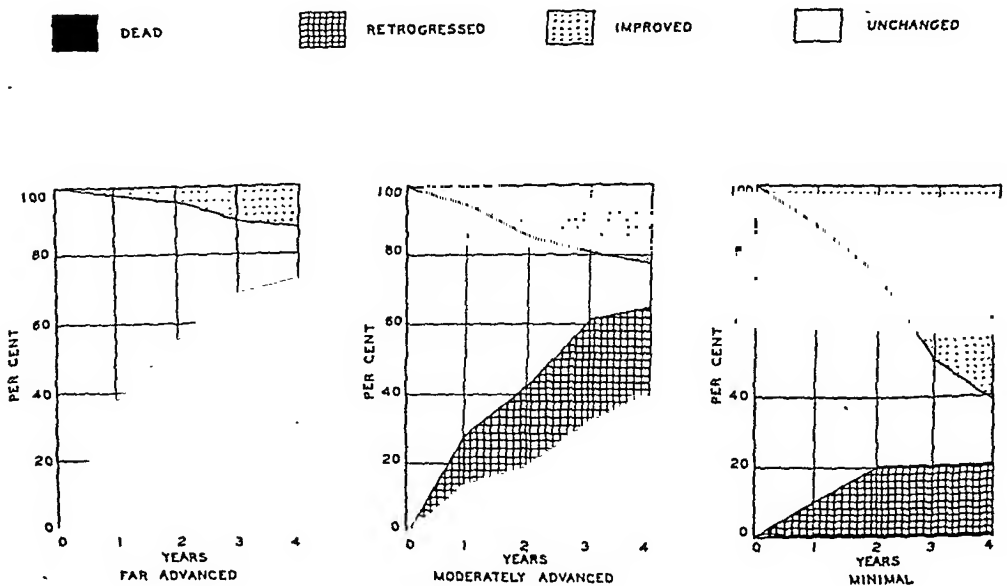
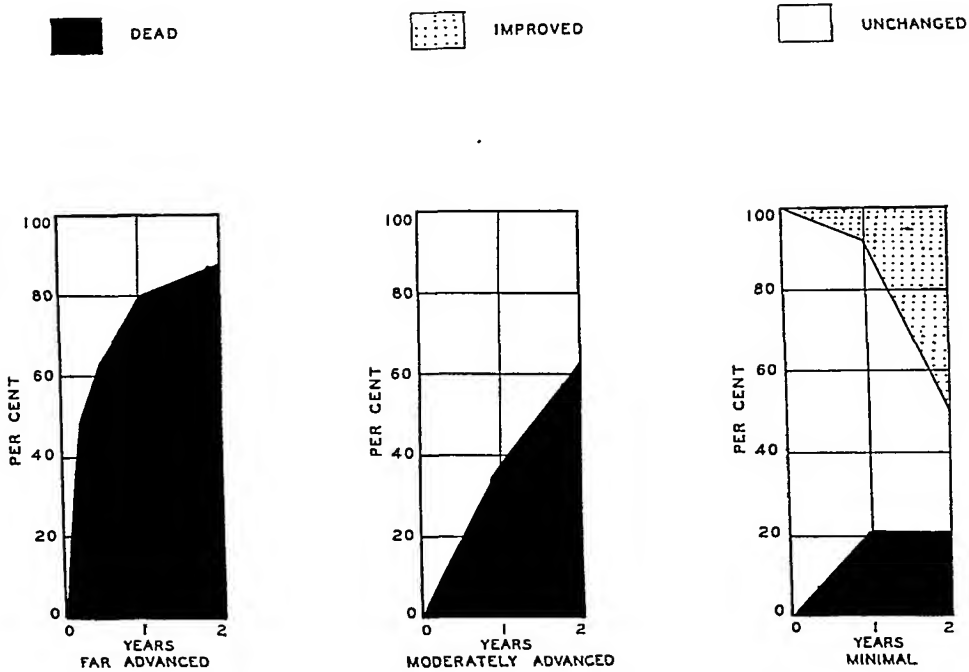


FIGURE II

STATUS OF CASES OF TUBERCULOSIS FOR TWO YEARS FOLLOWING DIAGNOSIS
COLORED



WILLIAMSON COUNTY TUBERCULOSIS STUDY

However, as improvements were noted for those minimal on diagnosis the prognosis for this group appeared to be more favorable.

The analysis of material according to the procedure which has been outlined should be of value to any person charged with the administration of an efficient program for the control of tuberculosis. This method can be extended to studies of other specific aspects of tuberculosis in various age, sex, and color groups and to the studies

of other diseases and conditions affecting health.

REFERENCES

1. Frost, W. H. Risk of Persons in Familial Contact with Pulmonary Tuberculosis. *A.J.P.H.*, 23, 5:426-432 (May), 1933.
2. Brieger, E. After-care and Rehabilitation. Supplement to the *Brit. J. Tuberc.*, 31, 4:1-142 (Oct.), 1937.
3. Hartley, Sir Percival Horton-Smith, Wingfield, R. C., and Burrows, V. A. The Expectation of Survival in Pulmonary Tuberculosis. *Brompton Hospital Reports*, Vol. IV, 1-53, 1935.
4. Puffer, Ruth R., Stewart, H. C., and Gass, R. S. Tuberculosis Studies in Tennessee: Subsequent Course of Cases Observed in Williamson County. *Am. J. Hyg.*, 28, 3:490-507 (Nov.), 1938.

(Discussion on page 900)

DISCUSSION

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THE only remarks I wish to make upon Miss Puffer's paper are those of commendation. Some modification of the life table method constitutes our only tool of real value in our search for an answer to many of our epidemiological and medical problems. The modification the authors have developed for the problem with which they had to deal seems adequate and is applicable to other problems.

I suspect that the reason the life table method or some modification of it is not more frequently used may be due to the fact that the keenness of this tool is not realized, or we are too lazy to undertake the thinking and work involved.

One naturally thinks of the desirability of using such a method in trying to determine the effect of different kinds of treatment on cases of tuberculosis. Not everyone is in agreement, for example, as to the efficacy of the modern surgical treatment of tuberculosis, such

as thoracoplasty. The application of such a method as developed by the authors to two large groups of tuberculosis cases, all in the same stage, one group without thoracoplasty, the other with, and a comparison of the results obtained for the two groups should furnish some definite assistance in evaluating this particular kind of surgical treatment. While this has been done, perhaps other studies are desirable to get additional evidence.

In studying many, if not most, problems, it goes without saying that the method would have to be applied to two observation groups; one, of course, to serve as a control.

I would like to ask Miss Puffer as to the number of cases on which the results set forth in the charts are based. The life table method, I judge, would call for a fairly large sample for accurate results.

It has been a pleasure to study and hear this paper presented.

Uses and Abuses of Biochemical Oxygen Demand*

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AS a control test in the treatment of sewage by oxidative processes, as a measure of the pollutorial strength of organic industrial wastes, and as a yard-stick in the survey of polluted waters, the biochemical oxygen demand determination has become the most widely used test in modern sanitary control of all liquid wastes. Like most tests which have been devised to measure the progress of natural biologic phenomena it has its uses and it has its limitations. Since the determination is in reality a measurement of biologic oxidation or, more strictly speaking, of the mass metabolic rate of a heterogeneous group of microorganisms, average conditions for normal biological growth must be maintained if optimum results are to be expected.

With domestic sewage these conditions are met satisfactorily since this waste is a mixture of various types of materials which have already partially undergone the degradation process which befalls all biologic material. Moreover, the bacterial flora which accompany this waste find their conditions of existence simply extended to

the final stage in the process—the oxidation and mineralization of these organic matters. This domestic sewage may then be classed as a natural habitat of the organisms which are to perform the oxidation, and for that reason we may expect more concordant results when this waste is under consideration. Experience has shown this to be true. The B.O.D. of these wastes seems to offer the best single test of their pollutorial strength. Industrial wastes, on the other hand, are more apt to be unbalanced in their composition and therefore not so suitable for bacteria propagation and the concomitant oxidation which always accompanies the aerobic attack of bacteria on organic matter.

Beet sugar, beet canning, paper, pulp, and strawboard wastes are good examples of industrial wastes which are high in carbohydrate material. Some of these may be so lacking in compounds of nitrogen and phosphorus that only a small fraction of the real B.O.D. will be obtained if standard procedure is followed. Mineral, chemical, and coke oven wastes are entirely unsuitable for the application of this biologic test. Moreover, those organic wastes high in nitrogenous constituents provide normal conditions for bacterial action, but the

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5 day period commonly employed may only give a small fraction of the total oxygen requirement which these wastes will demand when they are oxidized naturally under channel conditions in a stream or artificially in an activated sludge plant. The reason for this is found in the fact that the 5 day B.O.D. determination as carried out in the bottle test does not show any usage of oxygen in the oxidation of nitrogen and only up to about 68 per cent of that material usually termed "carbonaceous." Contact with oxidative sludge deposits in stream waters acts similarly to contact beds, trickling filters, and activated sludge, and the oxidations which take place in these stream waters probably carry a velocity constant of a magnitude more comparable with that of a trickling filter than that of a B.O.D. bottle.

The excess oxygen method as now used owes its origin to Frankland who in 1870 made attempts to study the pollution of the Thames River by incubating samples of the water over periods of time up to 7 days. Oxygen values were obtained at the beginning and end of the period selected by boiling off the gases *in vacuo*. Various procedures for measuring the usage of atmospheric oxygen have been employed since that time with improvements accruing up to the present procedure as found in *Standard Methods of Water Analysis*, 8th edition. Dr. E. J. Theriault, who has been largely responsible for the present technic as now used generally in the United States, in 1927 presented a comprehensive review¹ of the development of the B.O.D. test. Much of the early work was carried out under the leadership of Adeney and his associates of the Royal Commission on Sewage Disposal in England.

The mechanism of the test has been studied by many workers and early it was found that the presence of metabolizing microorganisms was a pre-

requisite of satisfactory performance. Thus Butterfield, Purdy, and Theriault² showed that, in a solution of peptone and glucose (5 p.p.m. each) in phosphate dilution water of pH 7.2, no oxygen would be used if this solution were incubated without inoculation with live bacteria; that dead *Acrobacter aerogenes* would likewise cause no usage of oxygen but that inoculation with live *aerogenes* organisms would cause marked usage of oxygen.

Inoculation of dilution water with a stale sewage or river water in those cases where insufficient organisms are present in the waste has become a rather common practice, though from a practical standpoint there probably are only a very few organic wastes which would not supply the inoculum if the bacterial food present were suitable for growth. The influence of inoculation on biochemical oxygen demand was studied by Eldridge³ using sodium bicarbonate dilution water for the determination of the B.O.D. of dilute (0.1 per cent) sugar solutions. He showed that by increasing the inoculum of settled Imhoff tank effluent, progressively, after deducting the B.O.D. due to the added sewage, a progressively higher B.O.D. on the sugar solution was obtained up to the point where about 5 ml. of sewage was present in 250 ml. of sugar dilution.

Holderby and Lea,⁴ working in our laboratory, repeated the work of Eldridge³ but used *sterilized* Imhoff tank effluent in place of Imhoff tank effluent *unsterilized* as used by Eldridge. For inoculum Holderby and Lea used filtered washed cultures of sewage organisms which had been grown on agar. The initial count on the B.O.D. dilution was about 2,000 live organisms per ml. The results of these workers showed increases similar to those of Eldridge in B.O.D. values on the sugar dilution with increasing amounts of *sterile* sewage added and

with the inoculum remaining constant. This seems to show quite definitely that the progressively higher results which Eldridge found were not due to increased seeding but to some other factor or factors present in the sewage which he used for seeding.

Analyses of plain domestic sewage made in our laboratory have shown a total phosphorus content of about 4.0 p.p.m. and a total nitrogen content of about 30 p.p.m. The phosphorus and nitrogen content in the sewage used by Eldridge and described by him as "quite weak due to rainy weather" must have contained at least half these amounts or in the final dilution of 5 ml. of sewage to 250 ml. of sugar dilution as used by him, there would have been available 0.04 p.p.m. of phosphorus and 0.3 p.p.m. of nitrogen. These amounts correspond quite well with the amounts of these elements which Lea and Nichols⁵ found necessary to add to plain sodium bicarbonate dilution water in order to obtain a B.O.D. on a 0.1 per cent solution of glucose of about the same magnitude as that obtained by Eldridge.

There is no doubt that seeding is required by certain types of wastes and also that it was required in the sugar solutions used by Eldridge,³ but the author cannot agree with him that the effect shown was due to seeding but rather was due to the addition of supplementary mineral substances, notably phosphorus and nitrogen, present in the sewage used as the inoculum.

Lea and Nichols⁵ obtained only a B.O.D. of 60 p.p.m. on a 0.1 per cent glucose solution using a dilution water seeded with sewage organisms containing 300 p.p.m. sodium bicarbonate, whereas when this water was supplemented with 0.02 p.p.m. phosphorus and 0.5 p.p.m. nitrogen a result slightly less than 500 was obtained on the same sugar solution. That these mineral supplements must be used

when certain wastes are evaluated by the B.O.D. test is shown by the following experience:

A sewage plant superintendent in Wisconsin was contemplating the acceptance of the effluent from a process used to treat waste sulphite liquor, the "bug-bear" waste of the paper industry. This effluent was found to have a B.O.D. of about 400 p.p.m. by the procedure given in *Standard Methods of Water Analysis*, 8th edition. Before he made his final decision on the acceptance of the waste effluent to his plant he decided to mix this effluent with his domestic sewage and evaluate the mixture by the B.O.D. test. In short, he found that a mixture consisting of 1 part sulphite effluent and 4 parts domestic sewage gave the astounding B.O.D. of 900 p.p.m., whereas calculation of the mixture from the B.O.D.'s of the two separately showed that the mixture should have a B.O.D. of about 240 p.p.m. When the B.O.D. of the sulphite effluent was calculated from the result obtained from the mixture it was found to have a demand of 3,500 p.p.m. which, under the conditions imposed, *i.e.*, mixed with domestic sewage, must be considered the true B.O.D. of this effluent. A B.O.D. was determined by the author on a sample of this waste collected at a different time using *plain* bicarbonate dilution water inoculated with sewage organisms which had been washed free of phosphorus and nitrogen compounds, and the result found to be 550 p.p.m. Samples of this same waste set up at the same time with the remaining inoculated bicarbonate dilution water left in the 5 gallon bottle but supplemented with the mineral salts mixture⁵ gave a B.O.D. of 4,235 p.p.m., a result nearly 8 times as great as with the bicarbonate dilution water of *Standard Methods*, 8th Edition.

The composition of this supplemented bicarbonate dilution water is given as follows:

Ammonium sulphate	2.5 p.p.m.
Tricalcium phosphate (anhy.)	0.01 "
Magnesium sulphate crystals	0.01 "
Dihydrogen potassium phosphate	0.1 "
Sodium bicarbonate	300. "

Stream waters³ examined over widely separated areas contain amounts of phosphorus and nitrogen comparable with that present in this supplemented dilution water. These low nitrogen-phosphorus wastes will use oxygen from the stream in a manner comparable with that shown with the supplemented dilution water since the nitrogen and phosphorus for adequate

in distilled water free from copper.

Results on other wastes showing the increased biochemical demands which are obtained with this dilution water are shown in Table I.

TABLE I

Showing a Comparison of B.O.D. Values Using Plain Bicarbonate Dilution Water and This Water Supplemented by Mineral Salts Containing Both Phosphorus and Nitrogen

<i>Type of Waste Examined</i>	<i>Results in p.p.m.</i>		<i>Per cent Increase in B.O.D. Values Using Supplemented Water</i>
	<i>B.O.D. Values Using Plain Bicarbonate Dilution Water Standard Methods 8th Edition</i>	<i>B.O.D. Values Using Same Water Plus Mineral Supplement</i>	
Glucose. 1,000 p.p.m.	60	470	670
Sulphite Waste Effluent	550	4,325	685
Domestic Sewage	217	221	2
White Water—Paper waste	25	62	148
Bleach Water—Paper waste	30	148	390
Black Liquor—Pulp waste	480	1,450	200
Pea Canning Waste	940	893	—5
Beet Canning Effluent	460	1,570	240
Settled Sewage*	135	140	4

* Results by Dr. W. D. Hatfield of Decatur, Ill.

It is seen from Table I that those wastes (sewages) which contain an adequate natural supplement of phosphorus and nitrogen give comparable B.O.D. values with the two dilution waters. Those wastes low in both nitrogen and phosphorus give much higher B.O.D. values when the supplemented water is used. A satisfactory reason for the low oxygen usage with plain bicarbonate dilution water on these wastes deficient in nitrogen and phosphorus is found in the absence of growth and multiplication of the bacterial flora in the B.O.D. dilution water.⁵

The question naturally arises—why do we want high B.O.D. results on these low nitrogen-phosphorus wastes?

bacterial growth will be furnished by the stream water. The supplemented dilution water is simply giving a true picture of what may be expected when these low phosphorus-nitrogen carbonaceous wastes enter stream waters. The evaluation obtained with plain bicarbonate dilution water of the 8th edition of *Standard Methods of Water Analysis* on these wastes will fall far short of the actual demand. Yet this supplemented water gives comparable results with the plain bicarbonate water on domestic sewage. Criticisms have been made that the supplemented water, containing ammonium sulphate, would cause a usage of oxygen due to this salt. Experiments on this aspect of the problem as published⁵ have shown

practically no production of nitrite or nitrate within the 5 day period and not sufficient in amount up to 30 days to influence the B.O.D. result greatly. Transference of the free ammonia nitrogen to organic nitrogen was noted in all cases, which seems to prove that the nitrogen used is entirely for bacterial cell growth.

Biochemical oxygen demand tests are used with impunity on all types of wastes to get a result. Very often little thought is given to the usefulness of the result obtained. Wastes high in free ammonia and organic nitrogen frequently will not give as high a B.O.D. value as similar wastes lower in nitrogen, yet these high nitrogen wastes will require much more oxygen from an activated sludge treatment process if the sludge is of the nitrifying type. Activated sludges of the nitrifying type are more apt to be present if wastes high in nitrogen are continuously presented for treatment. In these cases, evaluation of the high nitrogen waste should be made partially on the basis of B.O.D. with the added load calculated from the excess of nitrogen shown. Such a condition is found in a municipality in which a packing-house waste is treated with domestic sewage. Ammonium salts such as may be present in a gas plant or coke oven waste may increase the load on these plants far above that shown by a B.O.D. value. Dr. Clair N. Sawyer, working in this laboratory, has shown that ammonium chloride equivalent to 36 p.p.m. nitrogen was capable of extending the maximum rate of oxygen usage of a nitrifying type of activated sludge-sewage mixture from a normal time of about 2 hours up to slightly more than 5 hours with a total usage of oxygen double that of sewage alone before a base rate of the sludge for sludge re-use was obtained.

Substances inhibitory to bacterial growth such as copper in the dilution

water have been known for some time to have a retarding effect upon the B.O.D., but this has not been generally appreciated. Amounts of copper sulphate as low as 0.5 p.p.m. were found by Stovall and Nichols⁶ to be inhibitory to growth of bacteria in swimming pool waters. That small amounts of copper can cause appreciably lower B.O.D. results was emphasized to the author a short time ago. An industrial plant was required by the sewage authority to reduce the pollutorial strength of their waste to the strength of domestic sewage both as measured by B.O.D. Checks on B.O.D. results between the industry concerned and the sewage authority could not be obtained.

Our laboratory entered the picture to help iron out reasons for the continual discrepancy—the industry obtained results invariably 25 per cent lower than the authority. Our laboratory results agreed quite well with the sewage authority. Every detail of the various steps in the procedures from temperature control to reagent standardization was investigated without finding the cause for the discrepancy. The chemist from the industry's laboratory did his work in our laboratory and checked our results and those of the authority. He was also able to use our distilled water in his laboratory and get comparable results. It was then suggested that he test his distilled water with sodium diethyldithiocarbamate for traces of copper. This element was found to be present to the extent of about 0.36 p.p.m. Replacement of a copper valve on the distilled water tank with one made of aluminum solved the difficulty. The B.O.D. values which had been running 25 per cent low were now comparable with those results of other laboratories.

If the use of the B.O.D. test is to be extended beyond the realm of sewage testing for which it was

originally devised, so as to include diverse wastes, attention will need to be given to all conditions of bacterial growth in the B.O.D. test bottle. Not only must toxic and inhibitory substances be excluded from the test bottle, but adequate non-oxygen using minerals of cell metabolism be provided, either by the waste or in the dilution water; otherwise the test falls short of its "biochemical" name. The present plain bicarbonate dilution water as recommended by the 8th edition of *Standard Methods of Water Analysis* of the American Public Health Association is satisfactory for the B.O.D. determination on domestic sewage and its effluents, because these carry their own supplements of nitrogen and phosphorus, but this dilution water is wholly unsatisfactory for this determination on carbonaceous wastes low in soluble phosphorus and nitrogen.

B.O.D. results cannot be expected to give the entire picture of what effect

a given waste will have upon a stream, but they should evaluate each waste on a comparable and equitable basis so that the true strength of these wastes and their expected effect upon a stream or receiving water can be known as fully as possible. The addition of the supplements of phosphorus and nitrogen to the present bicarbonate dilution water of *Standard Methods* does not in itself cause a usage of oxygen but provides conditions as found in stream waters for natural biological growth which is admitted by all workers to be the basis of the B.O.D. test.

REFERENCES

1. Theriault, E. J. The Oxygen Demand of Polluted Waters. *Pub. Health Bull.* 173, July, 1927.
2. Butterfield, C. T., Purdy, W. C., and Theriault, E. J. *Pub. Health Rep.* 46, 393-426 (Feb. 20), 1931.
3. Eldridge, E. F. *Sewage Works J.*, 5:788-792, 1933.
4. Holderby, J. M., and Lea, William L. *Sewage Works J.*, 7:37-42, 1935.
5. Lea, William L., and Nichols, M. Starr. *Sewage Works J.*, 8:435-447, 1936.
6. Stovall, W. D., and Nichols, M. Starr. *J. Infect. Dis.*, 21:484-492, 1917.

Use of the Marginal Punch Card in Tabulating Vital Statistics Data*

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IN 1936, with the expansion of the public health program through funds made available by the passing of the Social Security Act, our division was enabled to employ the services of a trained statistician. Our limited legislative budget, however, prohibited the expenditure necessary for rental of mechanical tabulating and sorting equipment used in most state vital statistics offices.

It was at that time that we learned by chance of a system said to accomplish essentially the same results as mechanically operated machinery by the use of an ordinary hand punch and knitting needle, the installation of which entailed practically no expense aside from the cost of the cards.

Somewhat dubiously we visited the office of one of the West's largest department stores and were shown a system of unit stock control operated entirely by the punch card method. Our further study of the problem convinced us of its possibilities as applied to our own needs and we then and there embarked upon the experiment of adapting the marginal punch card, for the first time in a state health depart-

ment, to the tabulation of vital statistics data.

It is interesting to note that, although the first patent was issued in 1896, it was not until 1920 that the marginal punch card was used to practical advantage by Dr. Alan Gregg, who conceived the idea of using individual survey cards in tabulating the results of a hookworm survey in Brazil. He experimented with cards upon which information was coded by cutting notches around the border by hand with scissors. For group separation these cards were placed against the sharp edge of a ruler which fitted into the notches and forced the unnotched cards to a higher level. The separation was then made by picking out the unnotched cards.

A few years later Drs. Hackett and Soper adapted essentially the same system to other disease surveys, this time using a punch which "bit into the margin of the card, transforming the hole into an open notch." Rods or wires were run through a pack of such cards at any of these holes, whereupon the notched cards would fall out, while the others would remain suspended.

In the meantime the system has been developed, improved, and perfected to meet the requirements of every type of statistical analysis. It is seemingly so

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versatile that it can be applied to any number of diversified procedures with equally successful results.

The card originally used in our Division of Vital Statistics was 4 by 6 inches in size and provided for the coding of practically all the data contained on the mortality certificate.

During a year's experimenting we naturally discovered that certain improvements could be made. The original codes were revised slightly and the size changed to $3\frac{1}{4}$ by $7\frac{3}{8}$ inches, the standard size tabulating card, which we find considerably easier to handle. Our present card contains 90 holes—five to the inch—and provides for over 800 separate classifications. Causes of death are coded on the card according to the *International List*, and all classifications, including the sub-letters, and the sub-numbers under each letter, can be punched in 17 holes.

Cards can be divided and subdivided into all possible groups at the rate of about 5,000 an hour by means of a rod or sorting needle inserted into the holes in succession. The rod will lift out all cards not fulfilling the given condition and there is no necessity of reading the cards or dealing them one by one into piles.

The upper right hand corner is cut off so that it can be seen at a glance whether all cards in the pile are correctly arranged.

Errors in group distribution can be detected at once in piled cards, since each group should present an unbroken line of slots at a given point on the margin. Groups can also be placed together without confusion, since this marginal slot serves to distinguish one from another.

Where the data are broken down into small divisions—for example, infant deaths into hours, days, weeks, months, etc., the process of elimination requires considerable manipulation and the operation cannot be accomplished as

rapidly as would be possible with a mechanical sorter. On the other hand, where only a direct sort is needed, such as the separation of males from females, single from married, or whites from colored, only a single operation of the needle is required and the cards separate themselves into two distinct groups in less time than a machine can be put into operation.

While the necessity of hand counting might be a disadvantage in state offices where great numbers of records are tabulated, it presents no problem in a small state, since after the cards are broken down according to the data needed, the groups are relatively small and can be counted quickly.

In addition to the information actually punched, there is the information conveyed by the ABSENCE of punching. For instance, most deaths in Utah are of whites, so unless the decedent is colored, no punch is necessary. The same applies to male sex, nativity in state, and deaths occurring in homes. A card containing 90 holes may be punched in as few as 9 places and still mean just as much statistically as though the majority of the holes were cut.

The marginal punch card may be drawn up to fit the needs of any type survey, with as little or as much information as may be desirable. At the present time three separate divisions of our State Health Department are now applying the system to their own programs, all on cards of different size and shape.

With the development and growth of our full-time district and county health units the punch card system of tabulating will undoubtedly find its way into the field office. The financial impracticability of elaborate machines for handling such work in the local health units is at once apparent.

There is the possibility, too, of having the operator in the central office

punch two cards simultaneously, the duplicate to be forwarded to the district or county office where it applies.

Under some conditions it may be advisable to use the cards as an index. In this case the card should carry spaces for typing the name, age, file number, and any other data which cannot be indicated by punching. However, when the card is used, not as an index, but as an auxiliary for tabulation only, it need carry only the serial number for identification.

The system is so obviously simple that a person with average intelligence can become a proficient operator in a very short time. As many operators as may be needed can punch or sort at the same time, which is a distinct advan-

tage, especially at peak load periods when special reports must be rushed through by given dates. Punches and sorting needles are available for use at all times and there are no mechanical devices to get out of commission, thereby delaying the work.

To summarize the advantages of the punch card system:

1. It is practical and inexpensive.
2. It can be used anywhere in the field.
3. It is flexible and can be adapted to any type of survey and to any size card.
4. It is accurate. Possible errors in punching are obvious.
5. It is simple in principle and requires no special training on the part of the operator.
6. It is speedy and any number of operators may work simultaneously. Delays are obviated in that there is no machinery to get out of order.

Districting New Mexico for Sanitation*

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THERE are 31 counties in the State of New Mexico with a total area of 122,503 square miles. The population is approximately 3 per square mile. However, there are many square miles that are uninhabited.

Prior to the adoption of the Social Security Act there were only a few of our counties financially able to maintain full-time health units. The majority of the counties maintained a part-time health officer and in some instances, a public health nurse was employed. With the possibility of securing considerable outside financial aid, study was given to the advisability of placing the entire state under full-time local health service. This was accomplished by the adoption of the District Health Act which divided the state into ten health districts. There are from two to four counties in each health district. The division was made on a population basis and on the ability to pay. The districts have approximately 50,000 people each but the area involved varies from 5,000 square miles to 24,000 square miles. The average is about 12,000 square miles.

The executive is the district health officer, who is employed on a full-time

basis. In addition there are employed in each county at least one nurse and a clerk for the county health department.

Prior to the adoption of this Act the engineering division consisted of one sanitary engineer and a secretary. It was impossible to give close attention to the many sanitary problems which arose in the various communities throughout the state. About all that could be done was to maintain reasonable supervision over public water supplies, sewerage systems, and to a limited extent over milk supplies.

With Social Security funds a trained sanitarian has been placed in each of the ten health districts. Some of our men are graduate engineers who have received supplementary training in sanitation, but the majority of them have received other types of basic education. All but one are college graduates, and he has had 3 years of medicine.

The functions performed by these district sanitarians are basically the same as those performed by the sanitary officer in any full-time health unit. Restaurant and food sanitation, milk supplies, investigations of nuisances, and school sanitation consume most of their time.

In the larger cities we have been successful in getting the community to employ city sanitarians in order to relieve the district men of the burden of milk inspections, etc. In order to supplement the services of district and

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city sanitarians the State Health Department has recently employed a Milk Sanitarian whose services are available to the district units and to the cities.

Observations regarding the wisdom of such a districting plan have been very encouraging. Trained personnel is available for the routine work and the investigation of complaints. Much progress has been made in the improvement of market milk supplies and general sanitation. The district sani-

tarians are invaluable in the promotion and operation of the WPA Privy Project.

One district health officer recently made the statement: "If we had as many sanitarians as we have nurses, we could really do something about our high infant mortality rate."

So far we have been so encouraged with the district plan that it is our purpose to add additional county sanitarians as soon as funds are available.

Effects on Health of Gases Produced by the Electric Arc*

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IN view of the quantity of work done recently on the electric arc and the possible toxic effects of inhalation of the products of arc combustion, a review of the work would seem timely.

Because of his interest in ventilation and air conditioning problems, Dr. E. L. Mac Quiddy of Omaha prompted the Nebraska State Labor Commission to make a survey of the motion picture projection booths in the state. The Commission did this and besides ran some experiments with the arc itself. The results of their study were published in 1936.¹ They found that oxides of nitrogen were given off by the electric projection arc and they stated that there was a possibility of the oxides of nitrogen reaching disagreeable, if not toxic, concentrations in poorly ventilated motion picture projection booths. They stated further that an investigation of the booths in the state showed that most booths could be classified as poorly ventilated.

Fellowships were set up at the Harvard School of Public Health and at the University of Nebraska College of Medicine for the purpose of determining the combustion products of the arc, the effects of inhalation of the

arc fumes, and the proper methods of ventilation of rooms where arcs are used. Some of the results of these investigations were published in the April, 1938, issue of the *Journal of Industrial Hygiene*. More are to follow.²

EXPERIMENTAL

The main apparatus, used in the study of the arc fumes and their effects, consisted of an arc lamp of latest design and in common use in motion picture projection booths. The lamp was operated on direct current of from 40 to 55 amperes and 28 to 36 volts. The electrodes were high intensity 7 mm. positive, and 6 mm. negative copper coated carbons. Fumes from the arc were exhausted by means of a 5 inch flue attached to connections provided on the lamp house. A fan was arranged to draw a current of air through this flue system and discharge it out of doors. The fumes, after leaving the arc housing were conducted through a cooler to bring the temperature to 25° to 28° C. before passing to the animal's exposure chamber, which chamber was inserted in the exhaust flue line. In later experiments this apparatus was modified by inserting a filter in the flue line to take out the particulate matter in the arc fumes. Another piece of apparatus was a

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specially constructed chamber in which animals were exposed to the particulate matter, devoid of the gases, arising from arc combustion.

Air flow through the arc apparatus varied from 3.8 to 9.4 cu. ft./min. In analysis of the fumes both gaseous and particulate matter were encountered. Oxides of nitrogen and carbon dioxide were collected in Orsat tubes containing the proper absorbents and at flows of approximately 10 liters per hour. The phenoldisulphonic acid method,³ as well as the liquid air nitron method,⁴ was used for the analysis of the oxides of nitrogen. Under the conditions described concentrations of NO₂ from 100 to 205 p.p.m., expressed as NO₂ at 25° C. and 760 mm. pressure, were obtained in the exhaust flue.

Under the same conditions, using the method of Fieldner,⁵ concentrations of 2,450 to 2,770 p.p.m. of CO₂ expressed at 25° C. and 760 mm. pressure were obtained. No sulphur dioxide, carbon monoxide, or ozone could be detected by standard methods of analysis.

TABLE I

Chemical Composition of Ash from the "Suprex" Carbon Arc

Substance	Sample 5,222	Sample 5,223
	Per cent	Per cent
Silicon dioxide	1.79	1.21
Rare earth oxides	65.70	71.80
Ferric oxide	2.26	1.46
Calcium oxide	.53	.20
Potassium oxide	2.26	2.38
Sulphur trioxide	2.35	2.98
Phosphorous pentoxide	.17	.15
Fluoride	10.65	11.31
Boric anhydride	.50	.60

All samples contained a small amount of copper. A suspension of 5,222 in distilled water showed a pH of 5.5. All samples contained some unburned carbon and 5,223 a small amount of manganese. The rare earth substances are for the most part combined with fluoride, the compounds being extremely insoluble in water. The calcium is probably combined with the sulphate.

The particulate matter in the arc fumes on chemical analysis revealed the composition of the ash (Table I).⁶

The specific substances comprising the rare earth oxides mentioned in Table I and their relative proportions are as follows:

	Per cent
Cerium oxide	46
Lanthanum oxide	22
Neodymium oxide	22
Praseodymium oxide	8
Samarium oxide	3

Light field examination showed this ash to be composed of particles or agglomerates of particles in which 79 per cent of the particles were 1.5 to 0.75 microns in diameter. The concentration of ash in the exhaust flue varied from 3.5 to 5.3 mg./cu. ft.

Several groups of animals were subjected to various conditions of exposure to the arc products. In all cases animals were subjected to the highest concentrations of arc substances which were possible to attain with the apparatus used. The pathological physiology of the animals was studied by erythrocyte count, leukocyte count, Ehrlich and Schilling differential counts, hemoglobin, NPN, blood sugar, CO₂ combining power of the blood plasma, icterus index, blood spectrum, and body weight. Upon the death of every animal histopathological studies were made upon microscopic sections of the viscera.

During the course of the study the various conditions of exposure to the fumes were:

1. Exposure to gross arc fumes (gaseous and particulate matter). Acute and chronic exposure.
2. Exposure to filtered arc fumes (gaseous matter only, ash filtered out). Acute and chronic exposure.
3. Exposure to the ash alone.
4. Exposure to concentrations of NO₂, generated from copper and nitric acid, simulating the concentration range found in the arc flue.

In the group subjected to acute con-

tinuous exposure to gross arc fumes were 14 animals, including mice, rats, guinea pigs, rabbits, and cats. Twelve of the animals were dead in from 1 to 22 hours. The animals showed the spectrum of methemoglobin in their blood samples, and a lung edema clinically and microscopically. The guinea pigs showed a polymorphonuclear leukocytosis, and in those two surviving, the leukocytosis subsided in a week. There were no residual lung changes in the two animals surviving.

In the group subjected to chronic exposure to the gross arc fumes there were 5 rats and 5 guinea pigs. These animals were exposed for 1 hour per day 6 days a week to the fumes. Of these animals all 5 of the rats died in from 11 to 38 weeks, showing various stages of acute, sub-acute, and chronic inflammatory processes in their lungs. Of the 5 guinea pigs none died in a period of 10 months' exposure. Their blood samples showed no changes, the lungs showed no changes, and the animals gained weight.

Another group of animals was exposed for 4 hours per day, 6 days a week, to the gross arc fumes. Nine rats and 12 guinea pigs were included in this group. Of the 9 rats all were dead in from 1 to 16 weeks, showing various stages of acute, sub-acute, and chronic pneumonitis with fatty degeneration, abscesses, and gangrene. Of the 12 guinea pigs 11 died in from 2 to 8 months. The average weight loss before death was 100 gm. Each animal showed a polymorphonuclear leukocytosis at death. There was a terminal rise in NPN and a drop in CO_2 combining power of the blood plasma. All animals showed the spectrum of oxyhemoglobin in their blood samples. Histologically the animals showed acute paranasal sinusitis, patchy atelectasis, pneumonitis, fatty degeneration, and dust phagocytosis in their lungs. There were fatty changes in the livers.

The same types of exposure were repeated, but the particulate matter was filtered out of the fumes by the combined use of an oiled spun glass filter and a felt filter. To these filtered fumes, consisting of the gaseous elements of combustion, 12 guinea pigs were exposed 4 hours per day for 7 months. In from 1 week to 7 months 6 of the animals died, showing pneumonitis, patchy atelectasis, and a very few dust phagocytes. Their blood samples showed terminally a polymorphonuclear leukocytosis, increased NPN, and decreased CO_2 combining power of the blood plasma. There was a loss of from 43 to 166 gm. in weight for each animal in from 1 to 5 weeks before death.

Ten rats were exposed 4 hours per day to the filtered arc fumes. All 10 were dead in from 1 to 4.5 months' exposure. Sections of the lungs showed pneumonitis, abscesses, a very few dust phagocytes, and an hyperplasia of the lymphoid tissues.

Ten animals, including mice, rats, guinea pigs, and rabbits, were exposed acutely and continuously to the filtered arc fumes. Eight of the animals were dead in from 2 to 22 hours, showing methemoglobinemia and lung edema.

The findings in the animals subjected to the filtered fumes were identical with those findings in the animals exposed to the gross arc fumes except in the latter there were many dust phagocytes.

In order to compare the effects of inhalation of arc fumes to the effects produced by the inhalation of small quantities of pure NO_2 a group of animals was exposed to NO_2 generated from copper and nitric acid in a concentration range simulating that in the arc exhaust flue. Twelve guinea pigs were exposed 4 hours per day to NO_2 in a concentration range of from 100 to 200 p.p.m. All the animals died in from 3 weeks to 7 months, showing pneu-

monitis, atelectasis, and emphysema. The animals showed a terminal polymorphonuclear leukocytosis, an increased NPN, a decreased CO₂ combining power of the blood plasma, and an average weight loss of 71 gm. in from 1 to 4 weeks. Ten albino rats were exposed in the same manner. All died in from 1 week to 4 months, showing lung edema, pneumonitis, and patchy atelectasis.

Several of the commonly accepted laboratory methods of determining the effects of dust on animals were used in this study. Exposures to silica, talc, bituminous coal, iron oxide, carbon, and orris root were concurrently made as controls, while exposures to Suprex arc ash, Suprex core material, and mixtures of therapeutic and industrial carbon arc ash were made to determine the comparative effects of the arc dusts.

The methods of exposure included actual inhalation of Suprex arc ash in a dusting chamber. Concentrations of the dust varied from 12.8 mg. to 24.7 mg. per cu. ft.; 79 per cent of the particles were 0.5 to 1.5 μ in diameter. Definite changes were observed in the lungs, but detailed study has not been completed.

Another group of 50 rabbits was given intratracheal insufflations of the various dusts according to the method suggested by Kettle and Hilton.⁷ The dosage was 0.2 gm. in 2 cc. of sterile saline. X-rays of the chests of these animals were taken at 7 months and 10 months following insufflation. The animals were killed at 12 months after the initial insufflation at which time sections of the viscera were made for micropathologic study. This work has not been completed to the extent of drawing definite conclusions.

Subcutaneous injections of the various dust samples were made on the same rabbits receiving the intratracheal insufflation. The same dosage of 0.2 gm. of dust in 2 cc. of sterile

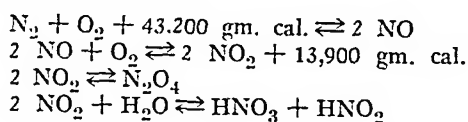
saline was used. Sections of the subcutaneous lesions produced were made upon the deaths of the various animals.

Intraperitoneal injections of the various dusts were made into rats following the technic of Miller and Sayers.⁸ Animals were killed at 15-30-60-90-200-360 days and sections were made of the viscera and the abdominal lesions produced. In like manner this study is not completed to the point of drawing conclusions.

DISCUSSION

Various modifications of the electric arc are used under such conditions as motion picture projection, photoengraving, treating with ultra-violet and infra-red lamps, flood lighting with search lights, and electro-welding. Titus, *et. al.*⁹ in 1935 called attention to the respiratory hazard occurring in electric welding. In most of the conditions mentioned the arcs are used in a closed space, and frequently a small closed space. Emphasis is placed on the fact that it is in those conditions of use of an arc in a small closed space without adequate ventilation that dangers from inhalation of the fumes of combustion arise.

The electric arc was discovered in 1812 by Sir Humphrey Davey. Shortly thereafter Cavendish discovered that the oxides of nitrogen were formed around the electric arc. The chemical process by which such a formation takes place has been well explained since today the arc process is one of the commercial methods of nitrogen fixation. The reactions which take place as the arc burns are ¹⁰:



The credit for having made the first observation that the concentration of the oxides of nitrogen might reach toxic levels when electric arcs are being

used should go to Dadlez, a Parisian physician, who in 1927 wrote that the concentration of oxides of nitrogen reaches levels which cause headache in operators and patients in rooms where electric arcs are used for infra-red and ultra-violet therapy.¹¹

Considering the results of the various types of animal exposures as a whole, the findings in the gross fumes exposure group, the filtered fumes exposure group, and the pure NO₂ exposure group, strongly suggest that the oxides of nitrogen play the chief rôle in producing the evil effects of inhaling arc fumes.

The figures of Lehman and Hasegawa as to the levels of toxicity of NO₂ seem to be generally accepted. These concentrations are calculated as NO₂ at 0° C. and 760 mm. pressure.¹²

	<i>p.p.m.</i>
Allowable concentration	39
Allowable one half hour	78
Directly dangerous	117 to 156
Rapidly fatal	780

The concentration range of NO₂ in the exhaust flue is well within this danger level as given by Lehman and Hasegawa. Coltman¹³ writes that on the basis of calculation a high intensity lamp in an unventilated room of 1,000 cu. ft. will bring the concentration of NO (nitric oxide) to 125 p.p.m. in 11 minutes. While with a white flame carbon arc using 1,400 watts, over 2 hours would be required to attain this level. These calculations are based on the assumption that no ventilation at all would occur.

Henderson and Haggard,¹⁴ Ireland,¹⁵ Winternitz,¹⁶ and Underhill¹⁷ have contributed considerably to the knowledge of the effects of inhaling irritant gases. The findings of lung edema in acute exposure, and various lung inflammatory conditions in chronic exposure to the arc fumes fit in with the current knowledge of the effects

of exposure to the group of irritant gases of which NO₂ is a member.

The methemoglobin found in the blood samples of the animals acutely exposed to the arc fumes results from the action of NO₂ on the moist mucosa of the lung in which reaction nitric and nitrous acids are formed. The nitrite ion is absorbed into the blood stream and its action on the hemoglobin causes the formation of methemoglobin. The nitrite ion may also cause a drop in blood pressure with resultant cerebral anemia. This latter action could explain the clinical condition of headache in persons exposed for too long a time to too great a concentration of the arc fumes. However, such a concentration could not be reached in properly ventilated projection booths.

The lung edema which occurred in those animals acutely and continuously exposed to the arc fumes results from injury to the capillary walls by the irritant gas with a resultant physiologic outpouring of fluid into the alveolar spaces. Wells¹⁸ says that this fluid is practically the consistency of blood plasma.

The chronically exposed animals showed various findings in regard to pathological physiology consistent with chronic inflammatory disease of the respiratory tract and resultant loss of appetite and starvation. These findings were an increased NPN, a decreased CO₂ combining power of the blood plasma and a loss of weight.

The results of these studies and similar reports indicate the need for considering the conditions under which electric arcs are operated. There is no basis for criticism of those operating conditions in which there is an exhaust flue in which forced ventilation is in use to remove the products of combustion no matter what the conditions of use are. However, there is danger in inhaling fumes coming from an improperly ventilated arc.

Very recently there appeared in the *Monthly Labor Review*¹⁹ a summary of a survey of the safety standards for motion picture machine operators in 186 cities in the United States having a population of 50,000 or over. One hundred and four of the cities had no laws as to the number or size of ventilation inlets of projection rooms. Ninety-five per cent of the cities had some requirement that systems should be vented to the outer air, but only 19 had definite specification as to area or diameter of vents in relation to room size, number of lamps, or number of men working. The results of the survey show that detailed requirements as to equipment to be used and methods of ventilating the projection room proper and the lamp house connected with the machine are not general. The cities of Hartford, Conn., St. Louis, Mo., and Philadelphia, Pa., as well as the States of Indiana and New York are the only ones that have definite requirements in regard to the system of lamp house ventilation.²⁰

In Hartford, Conn. the 1936 law states that the booth air must be changed at the rate of 30 cu. ft./min. The arc lamp housings must be vented to the outside air and must be provided with automatic shutters.

The St. Louis Law adopted in 1937 states that "each lamp house where carbons are used shall have an independent forced ventilation system of sufficient size to carry off independently of the booth ventilation, all fumes, carbon dust, and carbon monoxide gas generated in the lamp houses while in operation."

In Philadelphia a complete system of direct lamp house ventilation is required in all booths. The system must consist of a motor operated fan, which fan is connected in the booth lighting circuit so that it will switch on and off with the booth lights. The flue must be able to draw not less than 200

cu. ft. per minute per lamp. On spot lights or other projection equipment where the lamp house must be free to move, the exhaust duct is required to terminate in a hood above the machine, and the flue leading from the hood must discharge out-of-doors. Both the lamp house exhaust fan and the general booth exhaust fan are required to have separate sheet metal discharge ducts to the outside air.

In Indiana the state law requires that all arc lamp housings must be connected to the booth ventilation system.

In New York it is required that the arc lamp house of the machine be provided with a chimney and damper which shall carry off the products of combustion in the arc housing to the outside atmosphere.

Drinker and Snell²¹ recommend that the flue pipe from each projector lamp be ventilated at a minimum rate of 12 c.f.m. and that the booth be connected to the air conditioning system of the theater, or else ventilated at a sufficient rate to maintain comfortable temperature with relation to the outside air.

The ventilation system should be a forced one and the fan should be so wired that when the arc is struck the fan turns on automatically.

CONCLUSIONS

It may be concluded from these experimental studies that:

1. There are gaseous and particulate products of arc combustion. The oxides of nitrogen are the main toxic gaseous substances present. The ash is approximately 65 to 70 per cent rare earth substances, especially insoluble Cerium oxides and fluorides. The ash is composed of particles or agglomerates of particles for the most part 1.5μ in diameter or smaller.

2. The concentration of the oxides of nitrogen in the exhaust flue of a

projection arc is within the range of toxicity if the undiluted fumes are inhaled.

3. Inhalation of the gross and filtered arc fumes, occurring in concentration ranges as exist in the arc exhaust flues, causes the death of common laboratory animals exposed acutely and chronically. Acute exposure results in a methemoglobinemia and lung edema, and chronic exposure results in a pneumonitis, showing patchy atelectasis and chronic inflammatory changes in the respiratory tract.

4. The main conclusions that may be drawn from Drinker's work are that each projector lamp should be connected to a flue in which the fumes from arc combustion are exhausted by means of a motor driven fan to the out-of-doors. The fan should turn on automatically as the arc is struck and the exhauster should draw from 12 c.f.m. to 100 c.f.m. In general it may be said that if ventilation in the booth is adequate to give a comfortable working temperature in the projection room, there is no danger of the toxic gases produced by the electric arc reaching disagreeable concentrations.

REFERENCES

1. Department of Labor, State of Nebraska. Ventilation of Theater Booths. *Twenty-sixth Biennial Report of the Bureau of Labor*. June 1, 1935, to Dec. 1, 1936, p. 7.
2. MacQuiddy, E. L., Tollman, J. P., La Towsky, L. W., and Bayliss, M. L. The Combustion Products of the Carbon Arc, and The Biological Effects of Inhalation of Carbon Arc Fumes. *J. Indust. Hyg.*, 20:297-320, 1938.
3. Chamot, E. M., and Pratt, D. S. A Study on

the Phenolsulfonic Acid Method for the Determination of Nitrates in Water. *J. Am. Chem. Soc.*, 31:922, 1909; 32:630, 1910; and Redfield, H. W. *Ibid.*, 33:366, 1911.

4. Collins, W. S. The Nitron Method for the Estimation of Nitric Acid. *Chem. Abst.*, 2:384, 1908.

5. Fieldner, A. C., Oberfell, G. G., Teague, M. C., and Lawrence, J. N. Methods of Testing Masks and Absorbents. *Indust. & Eng. Chem.*, 11:519, 1919.

6. Communication from the Research Laboratories of the National Carbon Co. Cleveland, Ohio.

7. Kettle, E. H., and Hilton, R. The Technique of Experimental Pneumoconiosis. *Lancet*, 1:1190, 1932.

8. Miller, J. W., and Sayers, R. R. The Microscopic Appearance of Experimentally Produced Dust Nodules in the Peritoneum. *Pub. Health Rep.*, 50:1619, 1935.

9. Titus, H. C., Drinker, P., and Warren, H. Electric Welding—The Respiratory Hazard. *J. Indust. Hyg.*, 17:121, 1935.

10. U. S. Dept. of War Ordnance Office *Report on the Fixation and Utilization of Nitrogen*, 2041. Washington: U. S. Government Printing Office, 1922, pp. 132-147.

11. Dadlez, J. Sur la proportion des vapeurs nitreuses au voisinage d'une lampe arc pour traitement medical. *Compt. rend. de l'acad. d. sc.*, 185: 420-422, 1927.

12. Lehman, K. B., and Hasegawa, Dr. Studien uber die Wirkung technisch und hygienisch wichtiger Gase und Dampfe auf den Menschen (XXI) Die nitrosen Gase: Stickoxyd, Stickstoffdioxyd, salpetrige Saure, Salpetersaure. *Arch. f. Hyg.*, 77:323, 1913.

13. Coltman, R. W. Gases from Carbon Arcs. *J. Indust. Hyg.*, 20:289, 1938.

14. Henderson, Y., and Haggard, H. W. *Noxious Gases*. New York: Chemical Catalog Co. Inc., 1927. *Chem. Monograph* 35.

15. Ireland, M. W. *Medical Aspects of Gas Warfare*. The Medical Department of the U. S. Army in the World War. Vol. XIV. Washington: U. S. Government Printing Office, 1925, pp. 250-259.

16. Winternitz, M. C. *Pathology of War Gas Poisoning*. Yale University Press, 1920.

17. Underhill, F. B. *The Lethal War Gases*. New Haven, Conn.: Yale University Press, 1920.

18. Wells, H. G. *Chemical Pathology*. W. B. Saunders, 1925. 2nd ed. pp. 378-457.

19. Bureau of Labor Statistics, U. S. Dept. of Labor. Safety Standards for Motion-Picture-Machine Operators. *Month. Labor Rev.*, Jan., 1938. *Serial No. R-647*. U. S. Government Printing Office, Washington, D. C.

20. Communication from the Commissioner of Labor Statistics, U. S. Dept. of Labor. Washington, D. C.

21. Drinker, P., and Snell, J. R. Ventilation of Motion Picture Booths. *J. Indust. Hyg.*, 20:321, 1938.

DISCUSSION

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IN the case of poisoning from fumes from the carbon arc, as with many other public health problems, there are

two sorts of things necessary for the solution of the problem involved. One of these is the securing through experi-

mentation and observation of the necessary scientific knowledge; the other—the part that so frequently lags in the case of public health problems—is the application of that knowledge to the solution of the problem.

La Towsky's paper deals especially with the scientific part. That nitrogen is "fixed" by the electric arc and that the resulting compounds are toxic, has long been known. That an important industrial hygiene problem in connection with the use of the electric arc existed was recognized by the Nebraska State Labor Department in 1935, and some experiments to illustrate the necessity of adequate ventilation in motion picture projection rooms was done by the Nebraska (state) Health Department. Personnel of the Labor Department were shown experiments in which guinea pigs were exposed to fumes from the arc, and thereby the personnel was impressed with the importance of ventilation in connection with the use of the arc. At the conclusion of a series of such experiments a letter for the Labor Department records was written as follows:

Mr. V. B. Kinney
Labor Commissioner
State Capitol
Lincoln, Nebraska
Dear Sir:

Following information from you of a number of cases of chronic illness occurring among motion picture operators employing the carbon arc light for illumination purposes, some of these cases having been tentatively diagnosed as carbon monoxide poisoning, and at your suggestion that the laboratory aid in attempting to determine the nature of poisonous fumes emanating from the carbon arc light, some experiments were undertaken which will be discussed in the paragraphs to follow.

An apparatus was arranged to collect the fumes from above the carbon arc and cause them to pass through an enclosed glass chamber at a regular uniform rate. Guinea pigs exposed to such fumes in this chamber showed restlessness and irritation beginning a few minutes after exposure had started and progressing with increased intensity, the

animals staggering around until at the end of 45 minutes to 1 hour the animals so treated were unable to stand any longer. They were then removed from the chamber and a rapid recovery of the animals to apparently normal state followed.

An absorption train designed to absorb nitric oxide but to permit the passage of carbon monoxide was introduced between the carbon arc and the glass chamber. Tests for nitrites showed that this absorption train did not remove all of the nitric oxide gases but indicated that the amount of such gases reaching the chamber were considerably reduced. Guinea pigs exposed to the fumes in this chamber following such absorption showed no signs of irritation or toxicity at the end of 1½ and 3 hours' exposure respectively.

Spectroscopic examination of the bloods taken from these two series of experiments were made immediately following the experiment. The spectroscopic appearance of the blood from the animal exposed to the unaltered fumes showed an abnormal spectrum identical in appearance with the spectrum of some blood to which had been added a small amount of sodium nitrite. Spectrum of the blood from the other series showed identical with normal blood. No spectroscopic evidence of carbon monoxide poisoning could be found in the blood of animal so exposed.

The fact that nitrogen oxides are produced by the arc and that these oxides are toxic is not new knowledge. However, these brief experiments illustrate the importance of adequate ventilation to prevent exposure of workers to the fumes from the arc. The experiments conducted showed definite evidence of considerable toxicity resulting from the nitric oxides but showed no evidence of other poisonous substances in the fumes from the carbon arc light.

Respectfully yours,

L. O. Vose
Director of Laboratories
(State) Department of Health

La Towsky's experiments took up the scientific problem at about this stage and amplified and extended the scientific knowledge in an able manner. Especially interesting is the fact that certain species of animals were found to be much more sensitive to arc fume than were other species—a fact suggesting that there might be considerable differences in individual susceptibility

among humans. The work he has started on the composition and possible harmful properties of the dust from the arc should be completed and should be extended to include the various types of therapeutic carbons being used.

I understand these experiments as well as other of this nature have been conducted with ordinary atmosphere as present in the respective laboratories—probably atmospheres low in humidity and in carbon dioxide. These experiments found no evidence of carbon monoxide formation. The atmosphere of a small motion picture booth might be considerably different, containing higher concentrations both of moisture and carbon dioxide. It would be interesting to know what changes, if any, would occur to these compounds in the arc say in an atmosphere containing 2 per cent carbon dioxide with a high relative humidity.

The other part of the problem, that of securing adequate ventilation where arcs used in occupied rooms, will depend on educational and regulatory measures and the enforcement of the latter by labor departments, health departments or other organizations—largely governmental—that have to do with promulgating and enforcing regulations relative to safety and health in the industries.

Those engaged in such enforcement have found that the providing of suit-

able ventilation facilities is not sufficient. Inspection at intervals to check on repair and proper operation is also necessary. Instances are known where ventilation fans have been operated in reverse so as to cause arc fumes to be blown back on the operator in motion picture booths.

At one time a great many arc lights were used as sources of heat and ultra-violet radiation used for therapeutic purposes. Some of these were used in physicians' offices and others in private homes. It is probable that in most instances of use, ventilation was adequate. However, it could do no harm for those selling carbons for these arcs to accompany the merchandise with suitable cautions or information as to the toxic nature of the fumes.

This organization, The American Public Health Association, has, through its various committees and subdivisions, recommended standard practices covering many subjects of public health importance. It seems to me that the Industrial Hygiene Section could draw up standard recommendations covering this subject as they probably have covering other subjects of importance in securing safety in industry, these recommendations being suitable for adoption and use by the various agencies dealing with industrial hygiene in those places where the carbon arc might be a health hazard.

A Comparative Study of the Mouse and Guinea Pig Inoculation Methods in the Diagnosis of Rabies*

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PUBLIC health officials in many parts of this country report an increase in the prevalence of rabies in animals. The possible consequences in man are quite generally recognized. From an unpublished survey we have compiled a 5 year tabulation of rabies examinations in 10 municipal public health laboratories (Table I) which shows an increase in the number of such examinations in several of these cities.

There is a distinct need for improved methods in the laboratory diagnosis of rabies as well as the establishment of certain generally acceptable standards.

In view of the recent experiments of Webster and his associates^{1, 2, 3, 4} a renewed study of the laboratory diagnosis of rabies is both desirable and timely. In the routine diagnosis of rabies one frequently observes that when guinea pigs are injected with material for diagnosis irregularities of incubation period are encountered, and frequently the animals survive the in-

jections. The need for a more desirable test animal is obvious.

Despite reports⁵ in which mice have proved unsatisfactory as test animals, the recent studies of Webster indicate that certain inbred strains of mice are highly desirable for diagnostic purposes. A diagnostic test by mouse inoculation was developed by Webster and Dawson⁴ as an aid to the microscopic method. These investigators used a strain of albino mice indistinguishable from other mice except for their greater susceptibility to neurotropic viruses. The technic described by these investigators was only slightly modified in the present study. An approximate 10 per cent suspension of brain tissue from the ventral portion of the hippocampus major was made using salt solution as the diluent and larger clumps were removed by permitting them to settle in the mortar rather than by centrifugation. Throughout the entire study of guinea pigs received 0.1 cc. of the 10 per cent brain suspension intracerebrally while mice received 0.03 cc. When intramuscular injections were made 0.25 cc. of the suspension was introduced.

We might mention, however, that

* Read before the Laboratory Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 26, 1935.

TABLE I

Five Year Tabulation of Rabies Examinations in 10 Municipal Public Health Laboratories
(1931 to 1935 inclusive)

Municipal Public Health Laboratories		1931	1932	1933	1934	1935	Rabid Animals	
							Average Yearly No.	Average Yearly Rate per 100,000 Population
Louisville	P	86	105	135	213	253	158	52
	N	89	93	109	151	135		
	T	175	198	344	364	388		
Memphis	P	156	117	113	115	145	129	46
	N	244	185	206	248	221		
	T	400	302	319	363	366		
Los Angeles	P	*	*	376	234	367	326	25
	N	*	*	*	*	*		
	T	*	*	*	*	*		
St. Louis	P	19	29	204	118	54	85	10.5
	N	71	97	221	158	168		
	T	90	126	425	276	222		
Chicago	P	45	42	11	23	227	70	2.0
	N	253	367	274	272	409		
	T	298	409	285	295	636		
Detroit	P	12	1	1	3	46	12	0.8
	N	139	90	94	97	126		
	T	151	91	95	100	172		
New York	P	58	18	26	44	20	33	0.4
	N	357	363	440	531	568		
	T	415	381	466	575	588		
Baltimore	P	14	0	0	0	0	3	0.4
	N	37(a)	36	46	36	57		
	T	53	36	46	36	58(b)		
Washington	P	0	0	0	0	0	0	0
	N	0	0	0	0	0		
	T	0	0	0	0	0		
Milwaukee	P	0	0	0	0	0	0	0
	N	0	0	0	0	0		
	T	0	0	0	0	0		

P = Rabies positive; N = Rabies negative; T = Total number of examinations.

(a) = 4 doubtful reports; (b) = 2 brains reported unsatisfactory.

— = No information available.

NOTE: The data contained in this table were taken from a previously unpublished study.

impression smears were made of Ammon's horn and a portion of the cerebellum, and a thorough search made for Negri bodies. Throughout this entire study the modification of Van Giesen's stain for Negri bodies described by Nagle and Pfau⁶ was used.

The present study was undertaken to determine the comparative susceptibility of guinea pigs and mice to rabies virus with the view of establishing the certainty with which a confirmatory diagnosis of rabies could be made by animal inoculation.

From 1921 to 1934 a procedure was followed in this laboratory whereby all animal brains reported negative or doubtful on the basis of microscopic examination were injected intracerebrally into each of two guinea pigs in order to confirm the diagnosis. Since 1934, however, animal inoculations were made only when requested by the epidemiologist (Table II). This table summarizes the findings on 1,988 animal brains submitted to the laboratory for examination from 1921 to 1938. Of the total number of brains received

TABLE II

*Examination of 1,998 Animal Brains for Rabies by Microscopic Examination and by Guinea Pig Inoculation **

No. of Animals Examined	Kind of Animals	Guinea Pig Inoculations with							Per cent Reported Positive †	Per cent Found Positive ‡
		Microscopic Examination			Negative Microscopic Brains		Doubtful Microscopic Brains			
		Positive	Negative	Doubtful	Negative	Positive	Negative	Positive		
1,831	Dogs	993	799	39	772	27	29	10	54.23	56.25
134	Cats	3	121	10	120	1	10	0	2.23	2.98
10	Rabbits	0	8	2	8	0	2	0	0	0
8	Squirrels	0	6	2	6	0	2	0	0	0
4	Rats	0	4	0	4	0	0	0	0	0
5	Horses	1	3	1	2	1	1	0	20.00	40.00
1	Cow	0	1	0	1	0	0	0	0	0
1	Pig	0	1	0	1	0	0	0	0	0
1	Mouse	0	1	0	1	0	0	0	0	0
1	Gopher	0	1	0	1	0	0	0	0	0
2	Human	0	0	2	0	0	0	2	0	100.0
1,998		997	945	56	916	29	44	12	49.89	52.00

* Examinations made in the St. Louis Health Division Laboratories from 1921 to 1938.

† Reported positive on the basis of microscopic examination.

‡ Found positive by both microscopic and guinea pig inoculation methods.

997 specimens were reported positive, 945 negative, and 56 doubtful. Of the 945 specimens reported negative on the basis of microscopic examination, 29, or 3.7 per cent, proved positive on guinea pig inoculation, while 12, or 21.4 per cent, of the 56 doubtful specimens proved positive on animal inoculation. The average number of days from the time of injection until the time of death of the first guinea pig of each set was 19.7. Incubation periods varied from 8 to 59 days.

In order to determine the relative susceptibility of guinea pigs and white mice to rabies virus, animals were injected with brain emulsion from 27 dog brains showing Negri bodies on microscopic examination. The brain emulsion from each dog brain was injected intracerebrally into two young (200 gm.) and one old (350-450 gm.) guinea pig, and into each of 4 young (4-6 weeks of age) white mice. The animals were observed for a period of 9 weeks. None of the animals were examined for Negri bodies if death took place within 3 days after the injection. These deaths were considered to be

due to trauma. In this group of 81 guinea pigs only 1, 1.23 per cent, died from trauma, while of 104 mice mortality due to mechanical injury was 2.87 per cent.

The results of these comparative experiments are summarized in Table III. Only 9.3 per cent of the 104 mice failed to develop rabies, while 22.2 per cent of the 54 young guinea pigs and 44.4 per cent of the 27 old guinea pigs survived. The average number of days from the time of injection until the time of death of mice showing Negri bodies was 13.3, while the number of days for guinea pigs was 18.4. Furthermore, the first mouse of the series died in an average of 11 days, while the first guinea pig died in an average of 14.5 days. Of the 27 specimens reported positive for Negri bodies, 2 proved negative by the mouse method, while 6 proved negative by the guinea pig inoculation method.

One of these brains (Dog brain No. 2,582) produced rabies in mice in an average of 17 days. One guinea pig receiving an intracerebral injection of this same brain died in 36 days but

Negri bodies were not demonstrated, while the remaining 2 guinea pigs survived. This experiment was repeated at a later date at which time the original dog brain had been glycerinated for 75 days.

Two of 4 mice died in 16 and 20 days, respectively, and Negri bodies were demonstrable, while the 3 guinea pigs survived. Suspecting that guinea pigs were not susceptible to this particular strain of street virus, additional animals were inoculated. Guinea pigs receiving 16 day mouse brain virus died in 13 and 21 days, respectively; while guinea pigs receiving 20 day mouse brain virus died in 15 and 23

days respectively. Negri bodies were demonstrated in each case. This experiment suggests that the mouse is more susceptible than the guinea pig to small amounts of virus of low virulence.

Since St. Louis mice were used in these comparative experiments, due to the limited number of Swiss mice available at the time, an effort was made to determine the relative susceptibility of the St. Louis stock mice and the inbred strain of Swiss mice. The animals referred to in the remainder of this report as St. Louis stock mice consist of three different strains of mice obtained from St. Louis dealers. Ten microscopic

TABLE III

Comparison of the Guinea Pig and White Mouse Inoculation Methods on 27 Rabid Dog Brains

Dog Brain No.	Days in Glyc-erine *	Day of Death After Intracerebral Injection								Average Incubation Periods †			
		Guinea Pigs				White Mice				Guinea Pigs		Guinea Pigs	White Mice
		Young	Old	Young	Old	Young	Old	Young	Old	Young	Old	Pigs	Mice
2582	43	36—	S	S	2‡	15+	16+	20+	—	—	—	—	17
2585	37	17+	20+	33+	5—	14+	14+	15+	15.5	33	23.3	14.3	—
2586	47	S	S	S	S	S	S	S	—	—	—	—	—
2589	37	6—	S	S	9+	10+	10+	13+	—	—	—	—	10.5
2590	37	12+	30+	19+	9D	10+	15+	16+	16	19	20.3	13.6	—
2599	15	15+	20+	S	2‡	7—	9—	16+	17.5	—	17.5	16	—
2606	6	8+	9+	S	5+	5+	9D	12+	8.5	—	8.5	10.7	—
2607	6	16+	16+	S	5—	8+	14+	16+	16	—	16	12.7	—
2608	6	14+	S	25+	12+	13+	14+	18D	14	25	19.5	13	—
2609	4	19+	26+	S	13+	15+	15D	17+	22.5	—	22.5	15	—
2610	3	7+	22+	13+	12+	12+	13+	16+	14.5	13	14	13.3	—
2611	3	12+	19+	11+	7—	10+	11+	14+	15.5	11	14	11.6	—
2615	5	3‡	S	S	15+	15+	17+	21+	—	—	—	17	—
2616	5	20+	20+	21+	1‡	11+	14+	17+	20	21	20.3	14	—
2617	4	9+	15+	21+	9+	10+	10+	14+	12	21	15	10.8	—
2619	1	11+	23+	S	14+	16+	16+	S	17	—	17	15.3	—
2621	6	12+	15+	15+	9+	11+	13+	14+	13.5	15	14	11.8	—
2622	6	13+	19+	31+	8+	8+	10+	12D	16	31	21	8.7	—
2623	3	27—	S	S	13+	16+	16D	18+	—	—	—	15.7	—
2624	6	18+	21+	S	11+	11+	14+	19D	19.5	—	19.5	12	—
2625	11	17—	S	28+	14+	17D	19+	23+	—	28	28	18.7	—
2626	8	S	S	S	S	S	S	S	—	—	—	—	—
2627	8	16+	21+	34+	12+	12+	17+	S	18.5	34	23.7	13.7	—
2632	1	5—	17+	S	14+	16+	16D	19+	—	—	17	16.3	—
2635	1	5—	17+	S	14+	16+	16D	19+	17	—	17	16.3	—
2638	5	18+	21+	26+	9+	11+	13D	14+	19.5	26	21.7	11.3	—
2641	2	14+	17+	S	8+	9D	11+	13+	15.5	—	15.5	10.7	—
Average †		13.9	19.4	22.2	11.2	12.0	15.8	16.4	16.2	23	18.4	13.6	—

* Glycerinated brain (cornu ammonis) kept at room temperature for 24 hours, then transferred to ice box at 5° C.

† Average number of days from time of inoculation until death of animals showing Negri bodies.

‡ Animal died from trauma or of unknown complications other than rabies.

D Animal found dead and partially devoured. Examination could not be made.

S Animal survived. No Negri bodies found in brains examined after 9 weeks.

+ Negri bodies found on microscopic examination.

— No Negri bodies found on microscopic examination.

TABLE IV

Comparison of Susceptibility of St. Louis Stock Mice and Swiss Mice to 10 Strains of Rabies Street Virus

Brain Specimen Number	Mouse Stock	Animals Sacrificed † (days)			Day of Death After Injection of Virus			Average Incubation Periods ‡
		6	7	9				
2683	St. L.	—	—	—	13+	16+	19+	16
	Swiss	—	—	+	11+	13D	15+	11.6
2684	St. L.	—	—	8D	10+	13+	17+	13.3
	Swiss	—	—	+	11+	12+	15+	11.8
2685	St. L.	—	—	+	15+	16+	21+	15.2
	Swiss	2*	—	—	10+	10+	14+	11.3
2687	St. L.	—	D	—	10+	13+	15+	12.6
	Swiss	—	—	+	11+	12+	19D	10.7
2690	St. L.	—	+	+	10+	10+	13+	9.8
	Swiss	—	—	+	11+	13+	15+	12
2693	St. L.	—	—	+	11+	11+	14+	11.2
	Swiss	—	—	—	10D	10+	13+	11.5
2706	St. L.	—	—	—	10+	11D	S	10
	Swiss	—	—	8D	11+	11+	14+	12
2712	St. L.	—	—	+	14+	15+	17+	13.7
	Swiss	+	+	+	11+	13+	22—	9.2
2715	St. L.	1*	+	+	10+	13+	15+	10.8
	Swiss	—	—	+	11+	13+	16+	12.2
2717	St. L.	—	—	8+	10+	11+	14+	10.7
	Swiss	—	+	+	11+	12+	15+	10.8

† One animal sacrificed on each day.

‡ Average number of days from time of inoculation until Negri bodies were demonstrable.

* Animal died from trauma or of unknown complications other than rabies.

D Animal found dead and partially devoured. Examination could not be made.

S Animal survived. No Negri bodies found in brain examined after 6 weeks.

+ Negri bodies found on microscopic examination.

— No Negri bodies found on microscopic examination.

positive dog brains were used in these experiments. The same supernatant fluid from each specimen was injected intracerebrally and intramuscularly into mice of the two groups.

In order to compensate for possible loss in potency of the virus during the injection, mice were taken one from each cage, in rotation, alternating Swiss and St. Louis strains. One mouse from each group was sacrificed on the 6th, 7th and 9th days, respectively. Impression smears of Ammon's horn and the cerebellum were examined for Negri bodies. The results summarized in Table IV show only a slightly greater susceptibility to the rabies virus on the part of the Swiss mice. The St. Louis stock mice died in an average of 12 days, while the Swiss mice died in an average of 11.2 days. Furthermore, the first animal of the St. Louis group died or was found positive in 9.2 days while the first Swiss mouse

died or was found positive in 8.9 days.

Based upon the guinea pig inoculation method, several years' experience disclosed an error of 3.07 per cent for brains reported negative on the basis of microscopic examination. Suspecting that this low incidence of error might have been due to the uncertainty of the infectivity of guinea pigs, an experiment was undertaken in which animal brains reported negative on the basis of microscopic examination were injected routinely into each of 4 white mice. Both intracerebral and intramuscular injections were made. In this small series of 68 microscopic negative brains, only 2, or 2.94 per cent, proved positive by the mouse inoculation method. In one of these cases, in which a veterinarian's diagnosis of Dumb Rabies was made, Negri bodies were demonstrable in one of the 4 mice 17 days after the inoculation was made. In the other case a diagnosis of "sus-

pected rabies" was made by a veterinarian. Negri bodies were demonstrable in 11 days by the mouse inoculation method.

SUMMARY

A simple technic for the early diagnosis of rabies by mouse inoculation is described as a convenient means of verifying the routine microscopic (Negri body) method. The results of these experiments show that (1) the white mouse is the animal of choice in the laboratory diagnosis of rabies, Swiss mice being of no practical advantage; (2) that the demonstration of Negri bodies in the test animal is the only dependable criterion for a positive diagnosis since clinical manifestations are

frequently too variable and indefinite to be of any value; (3) that it is practical to attempt demonstration of Negri bodies by sacrificing mice on the 8th or 9th day after the inoculation; and (4) that the mouse inoculation test offers a more accurate, rapid, and cheaper means of diagnosis than the guinea pig method.

REFERENCES

1. Webster, L. T. *A.J.P.H.*, 28, 1:44 (Jan.), 1938.
2. Webster, L. T. *New Eng. J. Med.*, 217:687 (Oct.), 1937.
3. Webster, L. T. *A.J.P.H.*, 26, 12:1207 (Dec.), 1936.
4. Webster, L. T., and Dawson, J. R., Jr. *Proc. Soc. Exper. Biol. & Med.*, 32:570, 1935.
5. Koch, J. Kolle-Kraus-Uhlenhuth. *Handb. der Path. Mikroörg.*, 8:547, 1930.
6. Nagle, N., and Pfau, C. L. *A.J.P.H.*, 27, 4:356 (Apr.), 1937.

San Francisco's Hotels Are Examined for Cross-Connections

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THE contemplated large influx of visitors to San Francisco during the Exposition Year, 1939, indicated that plumbing of all hotels would be subjected to unusually heavy fluctuating loads. As a preëxposition preparation, a careful program of cross-connection survey was outlined and carried out, the San Francisco Water Department and Department of Public Health working as a single unit.

The principal objective was to guarantee that all hostelrys would be free of cross-connections and that all plumbing would be in proper condition to withstand the severe load brought about by abnormally heavy usage. It was felt that San Francisco was not unlike any other large city and that there were serious potential health hazards in the form of unsafe hotel plumbing and that all must be eliminated long before the guests would begin to arrive.

The term "cross-connection" has been used to designate a connection between a potable and an unpotable water supply. More recently, however, the term has been used to include any indirect connection of the potable supply with a polluted system which

would allow a return flow on the occurrence of a decreased pressure or partial vacuum in the potable supply line.

After several brief conferences of officials involved, a definite procedure was outlined embracing method of inspection to enforce necessary regulations toward abatement of undesirable conditions.

The city was geographically divided into 55 sections and one inspector of the Division of Water Purification of the Water Department and a plumbing inspector of the Department of Health were assigned to the task of original inspection. Each inspector covered a separate section of the city, 12 to 50 blocks, dependent upon the hotel concentration in each section. A block by block method was followed throughout. Daily reports of each inspection were filed in both departments. All reports showing hazardous or suspicious conditions were filed with the Chief Plumbing Inspector of the Department of Health who in turn assigned the regular inspector of the district to make further investigation, issue orders for correction, and reinspect at inter-

vals to determine degree of compliance.

The survey was inaugurated on June 1, 1938, and was completed by January 1, 1939. During this period, 651 hotels had been inspected. Correction of all hazardous conditions was obtained prior to January 15, 1939, which was a little more than a month prior to opening of the Golden Gate International Exposition, February 17, 1939. Limited time required confinement of our program to building piping, fixtures, and equipment. Inspection procedure in each establishment included general inspection of all piping, a notation being made of size, location, and purpose of same; location and type of sewers, condition of all sewer piping; fire system, and general inspection of any plumbing, water treatment equipment or special house storage. Particular attention was given to special sewage equipment such as pumps, syphon ejectors, and other handling machinery. The number, type, and location of all plumbing fixtures were recorded. Special attention was given to fixtures and connections of food handling equipment.

Buildings equipped with dual water supplies were given minute inspections, special attention being given to cross over line safety facilities.

As a result of minor repair work and extensions by resident engineers or maintenance men, inspectors found in some instances a maze of piping that made inspection difficult and time consuming. Unfortunately, in such instances because of turn-over of personnel, blue prints of the house piping were rarely available, and if so, the prints were usually the original building construction plans which did not in any way resemble the existing conglomeration of pipes.

Of the 651 hotels inspected, 82, or 12.6 per cent, were found to have one or more serious plumbing hazards. Most of the defects existed in the

larger hotels which in terms of total rooms and persons exposed would, of course, indicate a higher percentage of hazards.

From the individual reports, a compilation of data was made grouping hazards into 7 classifications, which were further classified under 27 separate items. The number of hazards found in each of the 7 groups were: direct sewer and water department water connections, 22; equipment with submerged inlets, 20; fixtures with submerged inlets, 1,359; prime lines ejectors and pumps, 59; other sources of water, 17; plumbing defects, 12; miscellaneous, 12, or a total of 1,501 hazards.

While enforcing corrective measures, no attempt was made to force owners to replace fixtures or equipment other than to correct connections to them. Sound advice and encouragement were given, however, looking to future remodeling or extensions when fixtures and equipment could be replaced. All owners were encouraged to consider gradual replacement of undesirable fixtures and equipment.

In addition and as an adjunct to the cross-connection survey, the method of routine bacteriological check of the general water supply has been revised. In place of sampling 3 days each week from 8 control points, there has been instituted sampling 3 days per week from 8 control points and 1 day per week from 16 control stations, the additional 8 being storage and pressure tank outlets within the city limits. In addition samples are examined once each week from hotels with dual water supplies.

As a result of this survey and correction of hazardous conditions found, it can be stated that the plumbing fixtures in all of our hotels are reasonably safe.

SUMMARY

The San Francisco Health and Water

Departments completed a cross-connection survey of all hotels prior to the opening of the Golden Gate International Exposition.

A definite procedure of covering the entire city was outlined and an inspector from each department assigned to the survey. Any hazards disclosed were brought to the attention of the regular district plumbing inspector, who followed through and obtained correction.

Six hundred fifty-one hotels were inspected in a period of 6 months; 82, or 12.6 per cent, were found to have a grand total of 1,501 hazards. All were corrected more than 1 month prior to opening of the Golden Gate International Exposition. Bacteriological examination of drinking water was increased to 4 times weekly, and the routine was broadened to include a wider range of storage and flow.

CONCLUSIONS

From this survey it is evident that entirely too much uncontrolled plumbing extensions, repairs, and remodeling are done routinely and unwisely in certain type buildings in large cities. As a result many plumbing hazards and potential hazards are established. Accurate blue prints of such work are not maintained, resulting in confusion because of changing personnel. It is evident that a community would reap large dividends through a small expenditure to finance a survey as herein described at least every 5 years. All building owners would benefit considerably by requiring maintenance men to file corrective blue prints on the premises every time changes were made in plumbing facilities regardless of how minor the nature of these changes may seem.

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NOMENCLATURE FOR THE COLON GROUP

THE nomenclature of the group of organisms with which we are chiefly concerned in our examinations of water and sewage, those which have for a long time been called in textbooks the colon-typhoid group, is still far from having been settled, and the usage which one finds both in textbooks and in journals is very confusing. Several years ago an attempt was made to formulate a definite nomenclature which would be followed in this *Journal*, but no agreement could be found among those who were believed to be best able to form an opinion.

Some two years ago the Secretary of the American Water Works Association and Editor of the *Journal* of that Association published a clear statement of the facts and announced the terms which would be used in that *Journal*. This nomenclature has worked acceptably.

In October, 1936,¹ a paper on this general subject was presented to our Association at the New Orleans meeting, in which the matter was discussed clearly and logically. This paper was the result of correspondence which had been carried on for several years by the two authors and we believe represents the best usage in vogue today. The authors suggested that these organisms be known as the "coliform group," and asked that sanitarians in the dairy and shellfish fields should be careful to use a terminology which would neither broaden nor restrict the definition of the organisms included under this term. This group included: "(1) aerobic or facultative anaerobic, (2) Gram-negative, (3) non-spore-forming organisms which (4) ferment lactose with (5) gas formation." This is the coli-aerogenes group of *Standard Methods*, 8th edition. The new *Standard Methods for the Examination of Dairy Products* uses the term "coliform" in the sense here outlined, placing in parentheses the correct Latin terminology (*Escherichia-Aerobacter*).

In dealing with the group of organisms generally used as an index for pollution, it is recommended that authors use the expression "coliform group." While *Escherichia-Aerobacter* is the accepted Latin terminology for this group, the term "coli-aerogenes" is officially used in the 8th edition of *Standard Methods for Water Analysis*, and will also be accepted as long as it remains in that volume,

but the former expression is to be preferred and has found its way during the past two years into the literature dealing with water analysis.

We ask our contributors to be careful in the use of these terms and to follow nomenclature adopted by the American Water Works Association and now by ourselves, for the sake of uniformity and clarity.

REFERENCE

1. *A.J.P.H.*, June, 1937, p. 560.

INSPECTION AND DISINSECTIZATION OF AIRPLANES

WE have several times commented on what the tremendous increase in the use of the airplane means to us from the public health standpoint,¹ notably very recently² we have mentioned the fact that the *Anopheles gambiae* has reached South America, presumably by means of an airplane from West Africa or on board one of the fast French destroyers which worked in connection with the French air lines between Dakar, West Africa, and Natal, South America, at that time.

In the daily papers we have just been reading with tremendous interest the report of the test flight of the Yankee Clipper from Baltimore to the Azores and Europe and back again and have noted that the regular commercial flights of this line of airplanes is scheduled to begin within a few months so that Europe will soon be connected with us by regular scheduled flights. The port of selection for this country is Baltimore, with Charleston, S. C., as the alternate landing place on account of its freedom from fogs. This news adds particular interest to reports³ from our Public Health Service, some of whose activities in this respect have already been mentioned in our columns.

The *Baltimore Health News*⁴ gives us up-to-date news for that city, where the Surgeon in charge of the U. S. Public Health Service Quarantine Station, is a member of the Advisory Committee on Sanitation of the Baltimore City Health Department. He and his predecessors have served in this way since February 14, 1933.

Quarantine officers make routine examinations of aircraft as well as of other ships coming into Baltimore, and passengers from foreign countries are inspected on arrival. With the inauguration of the transatlantic service doubtless similar arrangements will be made for Charleston, S. C.

Miami has a strategical position as an airport of entry for planes from South America and the West Indies. The inspection there of aircraft is made primarily for the detection of living mosquitoes, particularly *Aedes aegypti*.

During 1938, 398 airplanes from Central America, South America, and Mexico were inspected at the Pan American Airport, Dinner Key, Miami, Fla. Of these, 187 harbored many dead and some live insects. Of 651 insects recovered, 166 were alive. There were 45 mosquitoes on the plane, 40 dead and 5 alive. One was so crushed as not to be identifiable. Of the 5 living mosquitoes, none belonged to disease carrying species. Among the dead there was one *Anopheles albimanus*, which is one of the 26 listed by Covell as being the chief malaria-carrying *Anopheles* of the world. The *Anopheles albimanus* is found in Mexico, in Central America, and in South America, so that the indications are that it came from one of those countries, though it did not survive the trip.

House flies, midges, gnats, and other small flies, beetles, wasps, ants, moths, cockroaches, chinch bugs, as well as two spiders were found during the year.

Our Public Health Service has been on the alert since the airplane became a vehicle of international transportation. One-half hour before landing at Miami and at all other ports of call en route, planes from the south are sprayed with an atomizer containing a standardized pyrethrum extract, 2 grams of pyrethrin per 100 cc., plus 4 parts of a highly refined mineral oil. The planes' ventilators are kept closed for approximately 10 minutes after spraying on overnight stops. After disembarkment of the passengers and crew, thorough spraying is done and the plane closed for the night.

In addition to these precautions, trapping mosquitoes around Miami has been carried on for two years, during which 214,285 specimens of mosquitoes were taken. Each was identified and the survey showed that no new species of mosquito were detected and no species not already known in that area were found. We therefore have every right to feel that our health is being adequately safeguarded in this as well as in many other respects.

REFERENCES

1. *A.J.P.H.*, Sept., 1938, p. 1116.
2. Herms, William B. *Medical Entomology* (3rd ed.), 1939. Reviewed in *A.J.P.H.*, July, p. 799.
3. *Pub. Health Rep.*, Apr. 14, 1939.
4. *Baltimore Health News*, May, 1939.

LIABILITY FOR INJURIES DUE TO IMMUNIZATION

PROTECTION of individuals against disease by artificial immunization with vaccines, antitoxins, and sera is one of the most important of modern public health procedures. Millions of persons have been thus safeguarded against the ravages of smallpox, diphtheria, typhoid fever, tetanus, rabies, and various other dangerous communicable diseases.

Such immunizations are almost invariably harmless. They may cause some slight discomfort and inconvenience, but any temporary disturbance is as nothing compared to a case of the disease itself.

On rare occasions, however, injuries have resulted from immunizations. In most instances these have been due to negligence and carelessness on the part of the manufacturer of the biological product, the physician using it, or the patient himself. When ordinary care is employed, there is no possible danger from immunization, except in the relatively few cases of those who are unduly sensitive.

When such an injury occurs, the person actually responsible for it will be liable for damages to the injured person. As a rule, this action is based on negligence, which must be proved in a court of law by a preponderance of competent evidence.

An interesting case of this nature was tried recently in the Irish Free State.¹ A county medical officer of health arranged that the boys and girls of several schools should be immunized against diphtheria. He obtained toxoid antitoxin floccules from a reputable manufacturer in England and turned them over to a local medical health officer, who injected the children. Some weeks later, 24 or 25 of those who had been inoculated became ill, 4 in particular of one family

developed tuberculous abscesses, of whom one died from generalized tuberculosis.

The father, a teacher at the College, named Michael O. Chionnfhaolaidh (Kineally in English) sued the physician and the manufacturer in the High Court in Dublin for damages.

There was a great deal of testimony by actual witnesses and by medical experts to show that the proper technic was employed by the physician in giving the injections. Since there was, furthermore, no contract of sale between him and the plaintiffs, and no expressed or implied warranty by him of the quality of the product used, the case against the physician was dismissed by the presiding justice of the court, without submission to the jury.

The case against the manufacturer went, however, to the jury. Here the testimony showed that the manufacturer apparently could not have been negligent in preparing the toxoid and that the product could not have been contaminated with tubercle bacilli. There was also testimony by experts tending to fix the blame on the physician who performed the inoculations. The jury gave a verdict in favor of the manufacturer, which would seem to be justified by the evidence as it is reported. The father who had lost one child and had had three others infected was, therefore, unable to recover from anyone for this legal wrong.

In this country, it has been held by the courts that a manufacturer of a biological product is bound to use due care in its preparation and distribution, so as to protect the health of those using it. For failure to observe these duties, the manufacturer will be liable in cases of resulting injury, but he will not be liable for the improper, careless, or negligent administration of the product by physicians and others.² A municipal corporation will not be liable for injuries due to immunizations performed as part of its governmental functions. Since the individual who causes the injury by his negligence will be personally liable, due care must be taken by health officers and their subordinates and employees, and by city physicians and private practitioners in performing these usually beneficial minor operations.

REFERENCES

1. Inoculation Damages Claim. *Brit. M. J.*, Mar. 4, 1939, pp. 480-486.
2. Tobey, J. A. *Public Health Law* (2d Ed.). New York: The Commonwealth Fund, 1939, Chapter XIX.

BOOKS AND REPORTS

Background to Modern Science—
Edited by Joseph Needham and Walter Pagel. New York: Macmillan, 1938.
243 pp. Price, \$2.00.

This most interesting series of lectures had its inception in the belief that the lack of an organization for the study of the history of science at Cambridge, England, constituted a serious gap. In 1936 efforts began to remedy the situation. A committee was formed for arranging courses of lectures on the history of science. The committee has no doubt that the lectures given so far have been meeting a real need, and points to the fact that a great concourse of students, many standing or sitting on the floor, have gathered to hear these expositions of the progress in the sciences during the past 40 years.

It need hardly be said that no one reviewer could speak from intimate knowledge on all the topics discussed in this volume. Consequently the book has been submitted to a number of specialists and this notice is the result.

The names of the various lecturers are sufficient in themselves to assure us of the authenticity of the material presented and also of the excellent style in which the presentation is made. For almost every subject the inherent interest is enriched by the close connection which the author has had with the development of the field of which he writes. Two of the articles, those by Lord Rutherford and Dr. G. H. F. Nuttall, have especial interest as being the last public lectures which they gave. Lord Rutherford died before he could correct his proof and this service was well performed by J. A. Ratcliffe.

There is a uniformity of treatment

unusual in a book written by so many authors, which reflects credit on the editors. Duplication has been avoided to a remarkable extent and each author has kept in mind the fact that he was expounding abstruse subjects to an audience many of whom were either lay or not yet far advanced in the sciences discussed. The result is that the reader is not confused by a great mass of detail. The more important facts are given under each subject in language which is unusually simple and holds one's interest. There is not a lecture which cannot be read with pleasure and profit by the average layman and the whole series can be recommended unreservedly to the public, lay and professional alike.

Maz'YCK P. RAVENEL

Sanitary Law—In Question and Answer—*By Charles Porter, M.D., Barrister-at-law, and James Fenton, M.D. (4th ed.). London: H. K. Lewis & Co. Ltd., 1939.* 352 pp. Price, \$2.75.

Unlike public health legislation in the United States, which emanates from 49 different legislative bodies of the national government and the states, and shows it, all statutory law concerning public health in England is enacted by a single authority, the British Parliament. In England as here, however, there may also be subordinate legislation, such as by-laws and regulations promulgated by administrative departments. As a consequence, public health legislation in England is both profuse and complex, although it has been codified to a certain extent by the consolidation of the Public Health Acts in 1936.

This book, the first edition of which was issued in 1910, is an excellent guide to public health legislation in England. Its utility is enhanced by a good index. Americans interested in comparing British health legislation with our own scattered, diverse, and lavish health laws will find it of value.

JAMES A. TOBEY

A Textbook of Orthopaedic Nursing—By Evelyn C. Pearce, with a foreword by the late Sir Robert Jones, Bart, and introductory chapter by Dame Agnes Hunt. (2nd ed.). London (24 Russell Square, W.C. 1): Faber and Faber, Ltd., 1939. 230 pp. Price, \$2.50.

The author states that "the object of this book is to help nurses in training in the general hospitals of the country to a better understanding of the treatment of orthopaedic cases and consequently to a deeper interest in this branch of surgical nursing." It is really more than this, as it sets forth in clear and concise form the important facts with which all those interested in orthopedics are concerned. The book is exceedingly well written and illustrated. The preventive viewpoint, as well as the corrective, is stressed throughout. It is written in the language and style which we associate with well prepared English texts. The chapter by Dame Agnes Hunt, R.R.C., is well worth careful reading. Especial attention is given to crippling due to tuberculosis, rickets and poliomyelitis.

This little treatise can be recommended not only to nurses in training, but also to medical social workers, physical educators, and physiotherapists.

RICHARD A. BOLT

Annual Report for 1937, International Health Division, Rockefeller Foundation. New York: Rockefeller Foundation, 1938. 243 pp.

Public health and scientific research work of the Rockefeller Foundation, as reviewed in this report, indicate in a stimulating manner some of the major problems yet unsolved as well as gratifying progress in many fields. Highly valuable digests are given of papers on projects carried out under International Health Division auspices published elsewhere, together with references to the original literature.

Rapid advancement of knowledge regarding the virus diseases opens up promising new fields of investigation and control. At least four of these diseases are being studied, namely, influenza, vaccinia, rabies, and yellow fever. A virus of influenza has been isolated by transfer from man to ferret and transmitted from ferrets to mice. It is being employed diagnostically in standardized tests of human sera in mice for the specific protective antibodies. The virus grown in tissue culture has been used in experimental vaccination "with encouraging results."

The epidemiology of jungle fever is being attacked on several fronts, and improved methods of vaccination are being used to protect persons under exceptional exposure. Steps are being taken to prevent the carrying of infected persons during the incubation period to infectable countries by airplane or otherwise, in addition to precautions against the carrying of infected mosquitoes by airplanes. "A year's experience in the production and application of a cultured yellow fever vaccine virus, during which more than 59,000 persons were inoculated, mostly in Brazil, shows that there is now available a practicable safe method of large-scale immunization."

Studies of malaria, tuberculosis, yaws and syphilis are also reviewed, aid given to state and local health services is briefly described, and assistance given in various countries to the advancement of professional education is outlined.

This is an impressive record of service which should give much encouragement as well as useful information to public health workers. IRA V. HISCOCK

A Biological Approach to the Problem of Abnormal Behavior—
By Milton Harrington, M.D. Lancaster, Pa.: Science Press Printing Co., 1938. 459 pp. Price, \$4.00.

In this lengthy work Dr. Harrington has apparently erected the major part of his structure of theories for a new approach to the problem of abnormal behavior, for which he cleared the ground in his previous book, *Wish Hunting in the Unconscious*, published in 1934. In the early work he suggested a mechanistic psychology as opposed to the motivistic psychology of psychoanalysis, and it may be presumed that the intervening years have seen no change in his opinions concerning the defects and shortcomings of the Freudian explanations.

The book has an introduction, three parts, a résumé and an index. In the introduction, a short and clear opposition to the schools of Drs. Freud, Jung and Adolf Meyer, the author gives many reasons for his rejection of the animistic approach and presents his theory of a psychology built upon a physiological foundation.

Part one, offers the explanation of his basic concepts and methods and the problems of free will and animism, but still attacks Freudism very forcefully; for example, in his diatribe on the substantiation of the phenomena of consciousness, Dr. Harrington says: "... there were added to it the concept of the unconscious . . . a concept of which has been carried to its highest, or perhaps one should say its deepest, level of absurdity in the speculations of Dr. Freud." Since, according to his theory, every symptom hitherto explained on psychological grounds would be explainable physio-

logically, the old psychology has little value except to help in establishing a more direct theory, after which it would be completely nonessential.

In Part two, the author gives his physiological explanation for psychical phenomena. By starting with the conditioned reflex and deducing therefrom that conditioning is a matter of opening new paths through the nervous system for the transmission of nerve impulses, he proceeds to place sensations, emotions, memory and thought, craving and satisfaction, on a physiological or rather neurological basis (which seems more a change of name than a change in conception), dismissing the psychoanalytic theory, at least as it concerns forgotten memories, as untenable, without, however, being in complete agreement with the Watsonian Behaviorists. Similarly, mental adjustment is defined as "a matter of getting relief from nervous tension." Pain, pleasure, mirth, and anticipation are discussed as tension mechanisms, a theory upon which Dr. Harrington erects the third part of his book—the theory of mental disorder of psychopathology.

The author continues in his mechanistic approach to abnormal behavior by defining psychopathology as "the mechanism of behavior functioning in a quite unsatisfactory way," or the sense organs failing to "report" correctly in regard to the situation, or the failure of the "effectors" to respond to the demands made upon them; in other words, regarding psychopathology as neuropathology. Here he demonstrates his disagreement with the theories of the Kraepelinian psychiatrists by stating that there are four factors in the production of abnormal behavior—defective heredity, somatic disease, wrong education, and the stimuli afforded by difficult or trying situations, and avers that the two latter causes have been overlooked by the

followers of Kraepelin. He sets out to show that these factors can be caused by faulty transmission of nerve impulses or the paths "cut in his nervous system by previous experiences."

In spite of the author's determination to differentiate between the psycho-analytic or motivistic conception of the subconscious and his neurological or mechanistic explanation, it is difficult to see that there is any basic difference except in nomenclature. Here is an earnest effort to simplify to the average mind the mental processes by reducing them to a more concrete formula in physiological terms. Perhaps the book's virtue lies in the fact that an equation can only be solved by simplification, the removal of all unnecessary indices and brackets and ciphers; but it appears that where the workings of the mind are concerned such an equation must of necessity involve very complex and varied factors in the first place, which can only be brought to a simple equation by long, arduous and carefully studied work, with perhaps generations of experience, if the final answer is to be found. RALPH S. BANAY

Communicable Diseases for Nurses—By A. G. Bower, M.D., and E. B. Pilant, R.N. (4th ed.). Philadelphia: Saunders, 1939. 547 pp. Price \$3.00.

This latest edition of a book which has made a place for itself in the three editions which have gone before is welcome. It is written for nurses, and stresses the essential steps of nursing care and management. The chapters on Tuberculosis, Syphilis, and Gonorrhea have been rewritten by specialists in these branches, and an entirely new chapter on Public Health Control of Communicable Diseases has been added. The arrangement conforms to the curriculum guide outline.

The changes and additions to the book are well done and this fourth

edition maintains the high standard set by the previous ones. It can be recommended without hesitation for the teaching of nurses as well as a practical guide for graduates. The printing and make-up of the book are excellent.

ELEANOR KEELY

Fundamentals of Dentistry in Medicine and Public Health—By John Oppie McCall, D.D.S. New York: Macmillan, 1938. 161 pp. Price, \$2.75.

This book owes its existence to the fact that the author was invited by Dr. Smillie, Professor of Public Health and Preventive Medicine of Cornell University Medical College, to give some instruction regarding the teeth to medical students. For this purpose he prepared a "Primer" of which the present book is the successor.

The author lays his foundation properly on embryology and histology, then goes on to consider the various diseases to which the teeth are subject and the effect which these diseases have or may have on the general health. Some of the subjects, such as occlusion, pyorrhea, the so-called dead teeth, and caries, are constantly spoken of by the laity and have an interest for everyone.

Of late years diet and its relation to the development of teeth and their health has occupied the stage in an increasing degree. Under this general heading the relation between saliva and dental health is discussed to an extent slightly out of proportion to facts which have so far been established. While the subject is of immense interest the findings are hardly conclusive enough to claim a place in a book confined to fundamentals of dentistry.

The Glossary is particularly good. The illustrations are abundant and the printing is excellent. While intended primarily for medical students and public health workers, it can be recommended also to all dentists as a re-

fresher and to the medical profession, which so far has not enough acquaintance with the underlying principles to enable it to view judicially the fads for which both they and the dentists have been responsible. We refer particularly to the tooth pulling orgy for the cure of everything from hives to Bright's disease. The author is to be congratulated on his clear statements and his ability to condense the vast amount of useful information which he presents. A less able writer might easily have used twice the space without gaining anything in interest or instruction.

We wish for this useful little book the wide circulation that it deserves.

C. F. ELZEA

Health and Unemployment: Some Studies of Their Relationships—
By Leonard C. Marsh, in collaboration with A. Grant Fleming and C. F. Blackler. New York: Oxford University Press, 1938. 243 pp. Price, \$3.00.

This is the seventh publication in the McGill University Social Research Series. It is divided into 5 parts: (1) The elements of the problem—health and economic conditions, indices of public health, unemployment and nutrition; (2) adult workers—nutrition, physical handicaps and mental health; (3) juveniles and adolescents; (4) the family, including minimum standard budgets and relief; and (5) provision of medical care.

In discussing needs based on careful studies, the authors comment as follows:

In form, public health protective services are community-wide. They are intended to safeguard all citizens regardless of their economic standing. But even the benefits of safe milk and foods are limited, however, in a positive sense, to those who are able to purchase the variety of foods and the quantity of milk necessary for good health. Even more is this true of housing; and a correlation between low wages or low skill, and poor working conditions is well established. While the blanket of public health measures

may be equally spread, therefore, it cannot ensure equal coverage while these other limitations on health are unmet. Conditions of nutrition, which have come to the fore in the majority of the present studies, are an outstanding indication of this.

Furthermore, it is revealed that tuberculosis, also high in the ranks of the killing and crippling diseases, is more clearly a disease of the poor. It flourishes under those conditions which are commonly associated with poverty, poor nutrition, unhygienic living conditions, insufficient rest, and over-fatigue. A considerable amount of untreated tuberculosis was found among an unemployed adult group.

Among the unemployed groups examined only 55 per cent of the adults and 47 per cent of the youths could be rated as showing a good nutritive state. Of special interest is the statement that neither social agency cases nor those found on the relief rolls in the earlier years of the depression are representative of the "new unemployed." It is observed that the hardships of a reduced standard of living, and the incidence of ill-health, may well be greater among these latter groups than among the "old" unemployed. The authors advise that a survey to determine this will need not only to distinguish persons who have been on relief for short and for long periods, but also to cover unemployed persons not on relief.

Consideration of the problem of medical care includes a discussion of health insurance and this final paragraph.

The experience of health insurance in Great Britain is now well known: strongly opposed by doctors at the time of its passage over 25 years ago, the system in its essentials today has the complete support of the medical profession. The British Medical Association has placed on official record its approval of extensions of coverage and types of medical service in many directions, which will ultimately establish it as a complete system of medical care for the nation. In Canada many

spheres of medical care require attention before this stage is reached. But several important steps have been taken. Government-assisted medical care for the unemployed has been inaugurated and must be regarded as here to stay. The most immediate need is to improve these services and fill the gaps. Every extension involves responsibilities, but these will have to be undertaken if individual medical care for the mass of the population is to be brought up to the standards of adequacy and efficiency now accepted as necessary in public health facilities in the Dominion.

IRA V. HISCOCK

Historical Directory of State Health Departments in the United States of America—By Robert G. Paterson, Ph.D. Columbus, Ohio: Ohio Public Health Association, April, 1939. 68 pp. Price, \$1.00.

This historical directory is designed to trace the changes which have occurred in each state jurisdiction since the establishment of the first permanent state health organization in Massachusetts in 1869 and to serve as a source of information relating to the terms of each state health officer, the reports which have been issued, and other publications by the state department.

The volume has both historical and personal interest for those whose acquaintance extends over a number of years. It would appear from these data that the present state health officer of Wisconsin has been in office longer than any other, and that seniority is thereafter in the following order: South Carolina, Montana, Kentucky, Georgia, California, Minnesota and Connecticut, though in two cases the service of these state health officers has not been continuous.

A specially useful feature is the bibliography of publications descriptive of state health departments. While not entirely complete, this list is probably the only compilation of its kind. This publication represents a public service

of the Ohio Public Health Association which will be of wide use to the public health profession and should be in every library.

REGINALD M. ATWATER

Baby Care—By May E. Law, M.B., Ch.B. Philadelphia: Lippincott, 1938. Series of 13 Booklets. Price, \$2.00.

Baby Care is a unique and attractive series of thirteen booklets covering the important features of the care of infants from the prenatal period, month by month, through the first year of life. The booklets are encased conveniently in a durable cardboard container. Each section is written in simple, direct English and appropriately illustrated throughout. Mothers will appreciate the many helpful suggestions presented in understandable terms.

The author of this series is a woman physician, graduated from the University of Glasgow. She has had practical experience with children at the Royal Hospital for Sick Children in Glasgow, at Queen's Hospital for Children in London, and in the Hospital for Women and Children at Shadwell. Her interest in preventive pediatrics is attested by the fact that she was medical officer to Infant Welfare Centers in London and served as school medical officer for the County of Essex.

The viewpoint of this series is thoroughly modern and measures up to the standard of present-day pediatrics.

RICHARD A. BOLT

A Pocket Medical Dictionary—By Lois Oakes, S.R.N., Assisted by Thomas B. Davies, M.D. (3rd ed.). Philadelphia: Peter Rcilly Co., 1938. 397 pp. Price, \$1.00.

This handy small medical dictionary can be conveniently carried in one's pocket, and read at odd times as one travels or waits for a conveyance. A number of people occasionally read an English dictionary, not to solve cross-

word puzzles, but to improve their vocabularies. This dictionary can serve an equally good purpose in giving information on medical words and terms. It was prepared primarily for medical students—particularly British—as some of the data refer to titles and nomenclature commonly used in Britain. The book is not the less valuable on this account, or because its author is a nurse, for, as a member of examination boards, she has had wide experience in defining names and terms. Moreover, she was assisted by a physician, who is a prominent pathologist.

The supplementary information on abbreviations, dosage, diets, poisons, antidotes, and gas warfare precautions are useful, and the data on this last item indicate the recentness of the revision and its applicability to England.

In a small book all the less common diseases (such as Wernicke's) could not be included, and a few slips might be expected in printing, such as in column 2, page 2, line 13.

JAMES WALLACE

Laws re. Sanitization: Regulatory Measures Concerning the Sanitization of Drinking Utensils in Public Places. *New York: Public Health Committee of the Cup and Container Institute, 1938. 39 pp.*

The adoption of a new word, however much it may be needed, always meets opposition. There are excellent reasons why we should never say sterilization when we mean disinfection or, in the present discussion, the cleansing of drinking glasses and eating utensils. The word "disinfection" connotes so many other processes, its application to the aim of good dish washing methods stands against its use here. It seems certain therefore that the word sanitization will be adopted—in fact it has been adopted in this valuable compilation of laws and regu-

lations which concern the cleansing of public eating and drinking utensils.

There is definite need for a model ordinance to aid health officials and legislators in setting up local sanitary regulations. This compilation of "laws" makes the lack of such a guide all too evident. Examination of only a few of its pages will reveal the wide variety and range of regulatory demands which are more or less in effect in our several states. Regulatory measures which are obviously not enforceable are worse than no rules at all—except that they emphasize the need for intelligent guidance.

The following quotation from the preface is an accurate summary of this timely publication: "Glance at these laws. Some ordinances legally permit the use of chlorine as a sanitization agent; others do not. Sanitization by means of hot water is favored here and shunned there, and there is general disagreement as to temperature requirements and holding time. Although paper service is everywhere acceptable and in practice approved, not every ordinance contains a provision for its use. The required chemical content of rinse waters varies widely as does the time of exposure. Towel-drying is allowed in some places while air-drying is ruled elsewhere. Penalties fixed for violation of sanitization ordinances range in different cities from no stated amount to \$100 or 90 days imprisonment or both. And so on. The diversity of procedures has itself become a public health plague, and the efforts to eliminate contaminated utensils are to that extent frustrated."

A. P. HITCHENS

Medical Vocabulary and Phrases: English, German, French, Italian, Spanish—By Joseph S. F. Marie. *Philadelphia: Blakiston, 1939. 358 pp. Price, \$3.00.*

This is a very useful medical vo-

cabulary giving English, German, French, Italian, and Spanish equivalents. From its arrangement it will be more useful in writing and preparing papers than for translation since the rendition is from English into the other languages. However, many words, especially in English, French, Italian, and Spanish are very much alike and often spelled the same, or very nearly the same. Even for German there are many closely alike, especially scientific terms.

An appendix contains short and clear comments on the pronunciation of the vowels and consonants, syllabification, genders, and plurals of the four foreign languages. Finally 8 pages are given to medical phrases which one constantly uses in the hospital and field. It is said in the preface that the book is intended particularly for physicians and surgeons, public health and military medical officers, and nurses.

Reviewing a dictionary is difficult. One can only look for a certain number of test words. In this instance this has been done by several persons and no errors have been detected. The printing and make-up of the book are excellent. It is a most useful book for any editor or writer.

MAZŮCK P. RAVENEL

The Mental Hygiene Movement from the Philanthropic Standpoint—*New York: Department of Philanthropic Information, Central Hanover Bank and Trust Company, 1939. 73 pp. Reprints available from National Committee for Mental Hygiene, 50 West 50th Street, New York, N. Y., at \$.25.*

This is one of a series of surveys being issued by the Department of Philanthropic Information of the Central Hanover Bank and Trust Company.

The argument is founded on "the

fact that mental disease, like physical disease, is due to natural causes, and, therefore, more or less preventable and more or less amenable to treatment."

The mentally incompetent are divided into the psychotics (the insane), of whom as of January 1, 1937, there were 697,083 in the country, and the mental defectives, of whom, at the end of 1936, there were 99,374 in institutions, and 15,200 on parole, though "the vast majority of them are not confined in institutions but live at large in the community.'" The economic loss from mental disability, including loss of earnings and the cost of caring for these two classes, has been estimated at more than \$1,100,000,000 per year. The outlook is that more than one million boys and girls now in public schools will spend a part of their lives in institutions for mental disease.

An interesting historical summary is given. It was not until the close of the 18th century that Philippe Pinel in France, William Tuke in England, and Benjamin Rush in America recognized that mental disorder is an illness affecting the mind and not due to demoniacal possession or supernatural causes. The curability of mental disease evolved slowly. Dorothy Dix, in 1841, undertook an inquiry into the treatment of the insane in Massachusetts. The Civil War not only stopped her work but led to a retrogression in the study of the question. In 1844 what is now known as the American Psychiatric Association was formed. It was not until 1875 that the American Neurological Association came into being. There was a bitter fight between the neurologists and psychiatrists, with mutual distrust. The turn of the 19th century gave Kraepelin, whose work brought order out of chaos and shifted the emphasis of psychiatric research from the dead-house to the living patient. Next came psychobiology, under the leadership of

Adolf Meyer, who taught that "mental disease was to be regarded as a 'maladjustment of the *whole personality*, rather than as a brain disease in the purely physiological sense.'" The spark which touched off the present movement came in 1908, when Clifford W. Beers wrote his autobiography, *A Mind That Found Itself*.

Perhaps nothing will appeal to the public more than the humane care and intelligent treatment which is now given at many institutions for the mentally diseased, and the hope which they hold out for cure, not only through surroundings and care, but through medical treatment. High among these comes the treatment for syphilis, which is responsible for approximately 10 per cent of all new cases of mental disorder. Even the most baffling of mental disorders, dementia praecox, which accounts for about 50 per cent of some one-half million patients now in our mental hospitals, seems to be yielding in a fair number of cases to the "shock" therapies recently introduced.

Much attention is now being paid to mental hygiene, which means prevention—beginning with child guidance, schoolroom guidance, and mental hygiene in our colleges and universities. Of this new development it may be said "'a great multitude of persons are living happier and more efficient lives because of their knowledge of mental hygiene.'"

There is a good statement of the needs for the continuance and enlargement of this work. Mental hygiene societies have been formed in 26 states which supplement and reënforce the activities of the National Committee. The most urgent need in mental hygiene is for qualified teachers and practitioners of psychiatry. Fortunately, the requirements are extraordinarily high, the standards being set by the American Board of Psychiatry and Neurology.

Conditions in our mental institutions are not satisfactory. Many state hospitals, even those of enormous size, such as that at Brentwood, N. Y., with 8,000 beds, are overcrowded. In many parts of the country the mentally ill can still be found in almshouses and penal institutions, where medical care is inadequate. The cost is more than 200 million dollars a year, yet the combined funds of 48 states for research is less than one million dollars a year.

This booklet has been carefully prepared for the laity, and the reviewer is treating it from this standpoint, being a layman as far as mental disease goes. It is the clearest and most convincing statement of the situation the writer knows of. It can be commended to all laymen and to medical men as well, most of whom are, as it were, frightened away from mental diseases by the many new terms coined by psychiatrists and psychologists, which are not understood even by many of those who specialize in these branches.

The booklet is interestingly written, easily read, and free from the technical language which has led to confusion and obscured the facts by a mass of new-made verbiage. MAZÏCK P. RAVENEL

Your Baby and Child: A Book for Mothers—*By M. C. Overton, M.D., F.A.A.P. Lubbock, Texas: Your Baby & Child Publishing Co., 1936. 224 pp. Price, \$2.00.*

This is a simply written book in words which the mother can easily understand. It is made up of a number of short chapters covering practically all of the questions which an intelligent mother might ask. The arrangement of the material is by no means systematic, but a complete table of contents and index in large type make it easy to find the topic under discussion. The advice given to mothers follows generally modern pediatric practice.

RICHARD A. BOLT

BOOKS RECEIVED

- PUBLIC HEALTH LAW.** By James A. Tobey. 2d ed. New York: Commonwealth Fund, 1939. 414 pp. Price, \$3.50.
- CORRECTIVE PHYSICAL EDUCATION.** By Josephine Langworthy Rathbone. 2d ed. Philadelphia: Saunders, 1939. 305 pp. Price, \$2.50.
- THE ENDOCRINE GLANDS.** By Max A. Goldzieher. New York: Appleton-Century, 1939. 916 pp. Price, \$10.00.
- THE CLINICAL AND EXPERIMENTAL USE OF SULFANILAMIDE, SULFAPYRIDINE AND ALLIED COMPOUNDS.** By Perrin H. Long and Eleanor A. Bliss. New York: Macmillan, 1939. 319 pp. Price, \$3.50.
- YOUR CITY.** By E. L. Thorndike. New York: Harcourt, Brace, 1939. 204 pp. Price, \$2.00.
- MALARIA EDUCATION.** By Elma Rood. Madison College, Tenn.: Rural Press, 1939. 198 pp. Price, \$2.00.
- HEALTH FACTS FOR COLLEGE STUDENTS.** By Maude Lee Etheredge. 3d ed. Philadelphia: Saunders, 1939. 410 pp. Price, \$2.00.
- NUTRITION AND PHYSICAL DEGENERATION.** By Weston A. Price. New York: Hoeber, 1939. 431 pp. Price, \$5.00.
- TECHNICAL COMMISSION ON NUTRITION.** Guiding Principles for Studies on the Nutrition of Populations. By E. J. Bigwood. League of Nations: Geneva, 1939. 281 pp. Price, \$1.50.
- NURSING MENTAL DISEASES.** By Harriet Bailey. 4th ed. New York: Macmillan, 1939. 264 pp. Price, \$2.50.
- AN INDUSTRIAL DEPARTMENT OF HEALTH.** Bulletin No. 9. Department of Industrial Medicine, Northwestern University Medical School. Chicago: Northwestern University, 1939. 56 pp. Price, \$2.00.
- HEALTH PLAYS FOR CHILDREN.** By Ella B. Johnson, Clarence M. Lindsay and Others. Chicago: Beckley-Cardy, 1938. 112 pp. Price, \$4.00.
- PUBLIC HEALTH IN THE STATE AND COUNTIES OF VIRGINIA.** By J. F. Kendrick. Department of Health, Richmond, 1939. 105 pp.
- BOOKS FOR THE ADULT BLIND, INCLUDING THE TALKING-BOOK MACHINE ACTIVITY AND SERVICE FOR THE BLIND.** From the Annual Reports 1937-1938. Washington; Government Printing Office, 1939. 71 pp.
- CANNED FOOD REFERENCE MANUAL.** New York: American Can Company, 1939. 242 pp.
- MUELLER BRIDGES FOR HIGHLY PRECISE MEASUREMENTS OF TEMPERATURE.** Catalog E-33C(1), 1939. Philadelphia: Leeds & Northrup, 1939. 16 pp.
- MACMILLAN'S MODERN DICTIONARY.** Compiled and Edited under the Supervision of Bruce Overton. New York: Macmillan, 1938. 1466 pp. Price, \$3.00; with thumb index, \$3.50.
- NURSING IN SICKNESS AND HEALTH.** The Social Aspects of Nursing. By Harriet Frost. New York: Macmillan, 1939. 217 pp. Price, \$2.00.
- A COLLEGE COURSE IN HYGIENE.** By K. Frances Scott. New York: Macmillan, 1939. 202 pp. Price, \$2.50.
- HOUSING FOR THE MACHINE AGE.** By Clarence Arthur Perry. Revised Edition. New York: Russell Sage, 1939. 261 pp. Price, \$2.50.
- HOUSING THE MASSES.** By Carol Aronovici. New York: Wiley, 1939. 291 pp. Price, \$3.50.
- NUTRITION.** By Margaret S. Chaney and Margaret Ahlborn. Revised Edition. New York: Houghton Mifflin, 1939. 436 pp. Price, \$3.00.
- MEDICAL RESEARCH COUNCIL.** Report on Radium Beam Therapy Research, 1934-38. By Constance A. P. Wood, L. G. Grimmett, T. A. Green and Others. London: His Majesty's Stationery Office, 1938. 77 pp. Price, \$1.20.
- ALCOHOL. ITS ACTION ON THE HUMAN ORGANISM.** By a Committee originally appointed by the Central Control Board (Liquor Traffic) and later reconstituted by the Medical Research Council. Third Edition, Revised. London: His Majesty's Stationery Office, 1938. 176 pp. Price, \$3.00.
- LABORATORY GLASS BLOWING WITH PYREX BRAND GLASS.** Corning, N. Y.: Corning Glass Works (Laboratory and Pharmaceutical Division), 1938. 20 pp. Free upon request to users of Corning laboratory glassware.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

British Health Services—According to this author, 3,600,000 plus new homes have been provided in slum clearance schemes and every third family lives in a post-war house. Yet, he says, the speed at which some local authorities have tackled slum clearance has varied between dead slow and dead stop. How would he characterize the feeble American efforts in this direction?

ASBURY, W. The Future of Public Health Services. *J. Roy. San. Inst.* 59, 12:727 (June), 1939.

In the Spring of 1839—Many other interests are making publicity capital from baseball's hundredth anniversary, so there seems to be no reason why public health shouldn't have an inning. The story of the centennial of Abner Doubleday's game will entertain us one and all.

CASWELL, J. E. Baseball 100 Years Ago. *J. Health & Phys. Ed.* 10, 5:278 (May), 1939.

Rickettsiae Vaccines from Chick Embryos—Enough vaccine to immunize 135 persons against spotted fever can be cultured on a chick embryo. The vaccine thus prepared has been found effective for guinea pigs.

COX, H. R. Rocky Mountain Spotted Fever. *Pub. Health Rep.* 54, 24:1070 (June 16), 1939.

Getting Medical Advice—In sampling low income groups in New York City, a researcher asked 365 self-supporting families about how and where they got their medical services. Her findings suggest that in this group, at least, the free choice of doctors usually isn't very free and the choice is rarely very wise.

DAVIS, M. M. A Doctor of Their Choice. *Survey Graphic.* 28, 7:431 (July), 1939.

Water Supplies and Caries—In two cities in Illinois there are enough fluorides in the drinking water to cause a mild degree of dental mottling. In two nearby cities the water is almost free of fluorides. Children twelve to fourteen years old in the first two cities have less than half the incidence of dental caries than have similar groups of children in the cities with water free from fluorides. There was no discernable difference in the saliva of the children in the various cities, but the difference in oral lactobacilli reflected the differences in carious teeth. This paper should be on your "must" reading list.

DEAN, H. T., *et al.* Domestic Water and Dental Caries, Including Certain Epidemiological Aspects of Oral *L. acidophilus*. *Pub. Health Rep.* 54, 21:862 (May 26), 1939.

"The Nurse Says"—Public health nursing will be vastly improved in general when these factors (among others) are bettered: clinic services that do not belie the nurse's promises to the patient; complete and adequate histories on all patients before visiting; better distribution of community nursing resources; and actual services when needed—not merely advice. This is another of the interesting verbatim reports on what the nurse said to the patient and vice versa.

DERRYBERRY, M. Administrative Procedures that Interfere with Effective Public Health Nursing. *Health Officer.* 4, 1:18 (May), 1939.

Intracutaneous Smallpox Vaccination—Calf lymph virus gave a slightly higher percentage of takes than did

intracutaneous vaccination with chick virus, but severe reactions were less frequent with the latter. There was little difference in the scar.

ELLIS, R. W., and BOYNTON, R. E. Smallpox Vaccination: A Comparison of Vaccines and Techniques. *Pub. Health Rep.* 54, 23:1012 (June 9), 1939.

The New Public Health—This paper urges the creation of a unified, all-embracing federal health agency with a cabinet secretary at its head, empowered to administer grants-in-aid to disadvantaged parts of the country, to conduct research in administrative needs, and to inspire adequate public health education in its broad sense, but not to coerce local governments into the practice of general curative medicine.

EMERSON, H. Administrative Medicine. *N. Y. State J. Med.* 39, 11:1055 (June 1), 1939.

Who Gets Good Prenatal Care—Three-quarters of the women in comfortable circumstances (in certain Michigan districts) received prenatal care, whereas three-quarters of those in the underprivileged group didn't. City women had better care than rural. This is not a surprising statistic to students of social sciences, but it may be useful evidence of an accepted assumption.

GODDARD, J. C., and PALMER, C. E. Maternal Services in Michigan with Special Reference to Economic Status. *Pub. Health Rep.* 54, 20:825 (May 19), 1939.

Genes and Viruses—Reporting to the informed laity upon the chemistry of the tobacco mosaic virus, the author gives an excellently clear picture of what science has discovered in that borderland where life begins. The paper will entertain and inform health workers, even those whose knowledge of biochemistry is elementary.

HUNT, W. R. "Whence Cometh Life." *Sci. Month.* 48, 9:550 (June 3), 1939.

Pros and Cons Re Blood Tests—Ten good reasons for requiring premarital blood tests for syphilis and four weak ones against. Five strong reasons for requiring blood tests during pregnancy or at delivery and none, of any kind, against. Score: both tests win!

KOLMER, J. A. Laws Requiring Premarital and Pregnancy Tests for Syphilis. *J.A.M.A.* 112, 23:2385 (June 10), 1939.

British Health and Medicine—It takes a conservative Briton to show how radical are we here in this wild and woolly America. The R. E. P. report quietly commends the proposal that medical services, like education, should be free to all. This writer urges that all health and medical services be unified and that the M. O. H. be put at the helm.

MILLIGAN, E. H. M. Medicine and Public Health. *Pub. Health.* 52, 9:266 (June), 1939.

England Studies Industrial Health Hazards—Some swell quotations from Ecclesiasticus introduce this British discussion of industrial hygiene. Listen to these sage comments upon: (hours) "every carpenter and workman that worketh night and day . . ."; (diseases) . . . "the vapor of the fire wasteth his flesh, and he fighteth with the heat of the furnace"; (repetitive work) "so doth the potter sitting at his work and turning the wheel about with his feet; who is always carefully set at his work, and maketh all his work by number"; (housing) . . . "and they shall not dwell where they will nor go up and down."

MUNRO, D. Industrial Health Research. *J. Roy. San. Inst.* 59, 12:717 (June), 1939.

Statesmanship in Public Hygiene—It is devoutly to be hoped that every complacent health worker—and others too—will take this paper into his little corner to ponder over with open mind.

The temptation to quote many of the arresting statements of facts that we all should know is well-nigh irresistible.

PARRAN, T. Health Needs of the Nation. Pub. Health Rep. 54, 22:919 (June 2), 1939.

Three Dimensional Graphs—Acetone vapor inhaled by guinea pigs affects temperature and respiration as concentration increases. The findings of this study will be of greatest moment to industrial hygienists, but all health educators—and what health worker isn't—will be interested in the three dimensional graphs which reveal these findings.

SPECHT, H., *et al.* Acute Response of Guinea Pigs to the Inhalation of Dimethyl Ketone (Acetone) Vapor in Air. Pub. Health Rep. 54, 22:944 (June 2), 1939.

Dose To Be Taken Every Hour—We are pleased to assume that American plumbing is the wonder of the world. A blaster of pet delusions reminds us of some of the water-borne disease outbreaks that have resulted because we are so well satisfied with ourselves and our plumbing.

STEARNS, M. M. The Hazard of Faulty

Plumbing. Survey Graphic. 28, 6:382 (June), 1939.

Hypertensive Arterial Disease—Here is an excellent discussion of the predisposing and the provoking factors that produce high blood pressure. Worrying, ambition, and inability to relax, traits that contribute to fatigue, predispose. Infections and numerous poisons provoke. The disorder is controllable rather than curable. Periodic examinations are needed to discover it early enough for hopeful treatment.

STIEGLITZ, E. J. High Blood Pressure. Sci. Month. 49, 1:35 (July), 1939.

T. B. in the Teens—Bed rest alone does not modify the spreading of tuberculous lesions in youngsters in the second decade, nor does it reduce the mortality. Therapy doesn't effect the mortality in advanced lesions. The prognosis of soft early lesions is uncertain for ten years. Health educators should realize the import of these findings even though they are to continue to teach that early discovery means early recovery.

ZACKS, D. Pulmonary Tuberculosis in the Second Decade of Life. Am. Rev. Tuberc. 39, 6:683 (June), 1939.

Previewing Pittsburgh's Science Centers

BUSTLING Pittsburgh, scene of the 68th Annual Meeting of the American Public Health Association in October, is a world center of chemical, engineering, and medical research. Not only is it the home of five institutions of higher learning and 38 hospitals, but also it boasts dozens of industrial laboratories in which new trails are blazed in technology, speeding the forward march of man.

The Committee on Scientific Trips has surveyed the rich field for tours and has made a comprehensive selection of the institutions, plants and laboratories for inspection by organized large groups of convention guests. In addition to the official tours, members will be able to make their own special arrangements to visit other local points of individual interest.

But meanwhile, the Publicity and Scientific Trips Committees will endeavor, in some small way, to give delegates a "preview" of points to be covered in scientific trips.

Air Hygiene Foundation—This organization represents a collective, scientific effort upon the part of some 250 industrial concerns for the advancement of industrial health. The Foundation, a non-profit corporation, maintains its headquarters and a Multiple Fellowship at Mellon Institute. It also makes research grants to the Saranac (N. Y.) Laboratory, Harvard School of Public Health, and University of Pennsylvania for studies and investigations in industrial hygiene. For instance, the Foundation recently issued a report to its member companies on the results of an X-ray research. Companies large and

small, in all lines of the "heavy" industries, have joined in this combined effort upon the part of employers in behalf of employee health.

Convention guests will have the opportunity of learning in detail about the work of the Foundation through its exhibits at Mellon Institute and at Convention Headquarters.

Aluminum Cooking Utensil Company—The New Kensington works of the Aluminum Company of America is the largest aluminum cooking utensil plant in the country.

The Aluminum Company had its origin in the Pittsburgh Reduction Company, which was founded in 1888 for the purpose of manufacturing aluminum by the Hall process. For several years it occupied a location on Smallman Street, Pittsburgh. Later it was moved to New Kensington, 18 miles up the Allegheny River.

The New Kensington plant is principally known for the manufacture of aluminum cooking utensils. In addition to the manufacture of such articles, visitors will see the rolling of aluminum sheet.

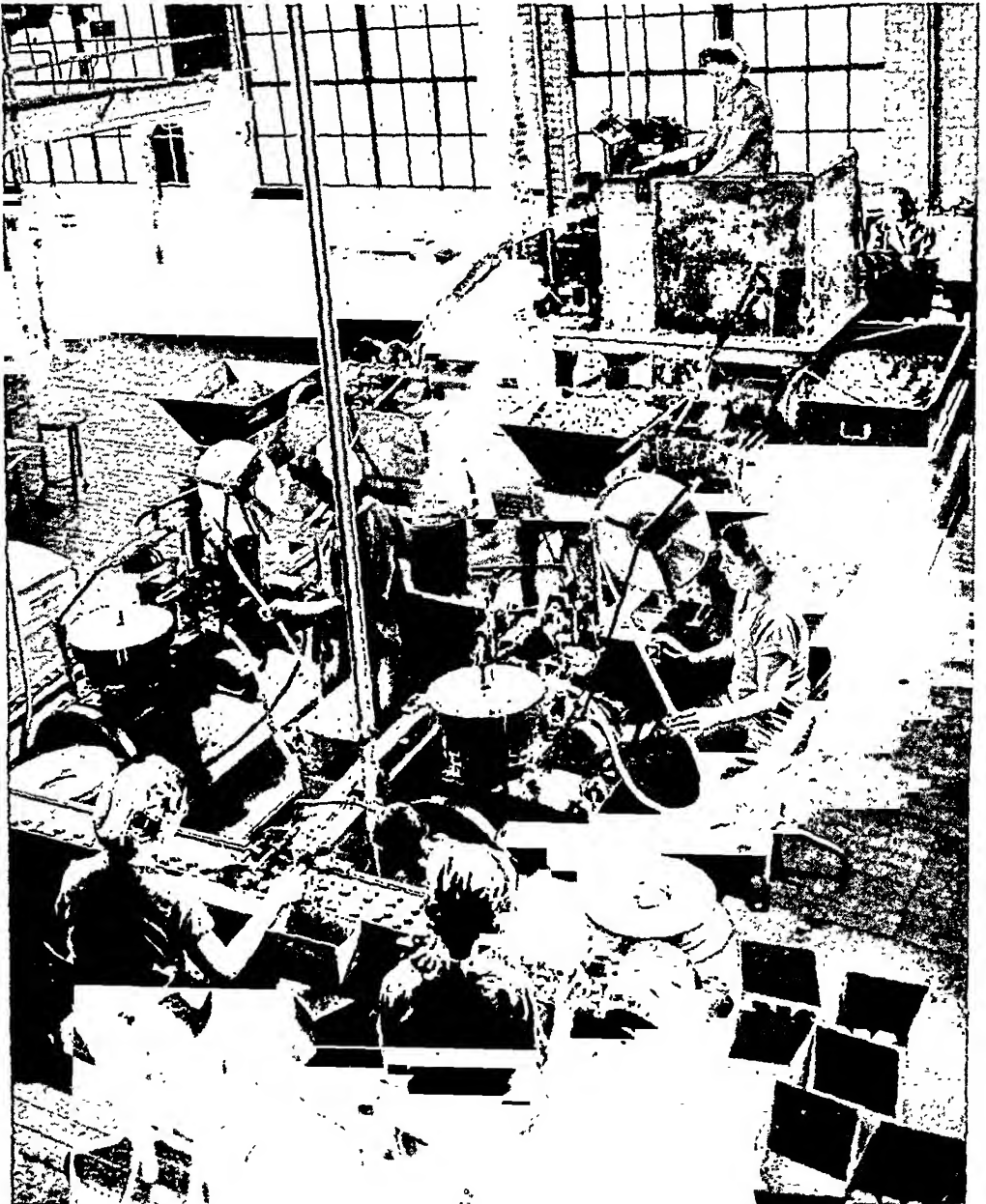
After the guests have completed their tour through the cooking utensil mill, they will be escorted to the Aluminum Research Laboratories, also located in New Kensington and noted as the largest aluminum research laboratories in the world.

Then the guests will have an opportunity to see, at close range, the world's most powerful testing machine, which, it is hoped, will be in operation by October 17.

Large extrusion presses make mold-

ings, trim, and other architectural shapes. This is a most interesting operation. A billet of aluminum is placed in the presses back of a die, and the pressure from the presses force the

aluminum through the die in any desired shape. The metal comes out of the press like tooth paste from a tube. Strong aluminum alloy sheet also is made here. This is the sheet that goes



New universal unit for the manufacture of aluminum bottle closures. The caps are first blanked from sheet (upper right), then conveyed to units for trimming and beading. Liners are inserted, and the caps are carried on belts to the inspectors (lower left), who examine both inside and outside of each cap. The machine is capable of producing up to 5,000 finished pieces an hour.

into the manufacture of airplanes and other structures where high strength combined with lightness is essential.

Great activity is to be found in the seal mill, where bottle caps and closures are made for innumerable products. Another important division is the foil mill, where aluminum foil is made for such purposes as milk bottle caps, wrappers for butter, cheese, tobacco, cigarettes, chewing gum, and candy. This foil can be colored, printed, and embossed, so that thousands of attractive patterns are available.

These commodities give some indication of the widespread use of aluminum, which, in a little more than fifty years, has gone from a laboratory curiosity to a material which is fourth in point of volume used among all metals.

City Filtration Plant—The city filtration plant is located in Aspinwall,

a suburb of Pittsburgh, about 8 miles from the city limits. It consists of 60 acres of filter beds all underground. The only surface indication of any activity is the general office and the pumping station along the river bank nearby. The water is pumped from the Allegheny River to a settling basin where the heavier impurities are deposited. It then flows by gravity to one of sixty filter rooms each approximately one acre in area. These rooms are about 10 feet high, with a concrete roof, over which is a 3 foot layer of soil. The floor of the room consists of a layer of sand several feet thick through which the water passes. After the water has passed through, the top two or three inches of sand are removed and washed to remove impurities, and then redeposited on the floor.

The filtered water flows by gravity



A dust determination in the course of a study by Air Hygiene Foundation.

back to the pumping station at the river bank, and it is then pumped to the Highland Park reservoir several miles distant for distribution throughout the city.

H. J. Heinz Company—The plant we will visit is the largest food products manufacturing establishment of its kind in the world. Its "57" varieties are used on millions of tables both in this country and in foreign lands.

Uniformed guides will conduct the group through the plant, showing visitors the preparation, closely supervised, of vegetables and fruits for canning and preserving. Great care is taken to insure the purity and quality of Heinz products.

Visitors will see the bottling depart-

ment for pickles. Here the pickles are graded, sorted, and bottled without ever being touched by human hands. Pickles are all bottled by hand labor, but the girls use wooden forks and spoons to handle the food.

The Heinz plant also has its own can manufacturing department. Machines cut, trim, roll, and form the metal, and then seal the bottom of the can, all in one operation.

Hospitals in the Pittsburgh Area—In addition to tours to industrial research laboratories and plants, arrangements are being made for a series of visits to various hospitals, particularly to those in which research is being conducted on public health problems.

Jones and Laughlin Steel Corpora-



Quality control is constant. The testing begins with raw materials for only the choicest are used. The preparation of foods is under scientific control. Heinz scientists are constantly looking for new and better ways to prepare food.

tion—The 96 inch continuous strip mill of the Jones and Laughlin Steel Corporation has been in operation a little over 2 years. It is located on a site of more than 23 acres between the Monongahela River and Second Avenue not far from the business section of Pittsburgh. It extends along the river for a little less than one-half mile.

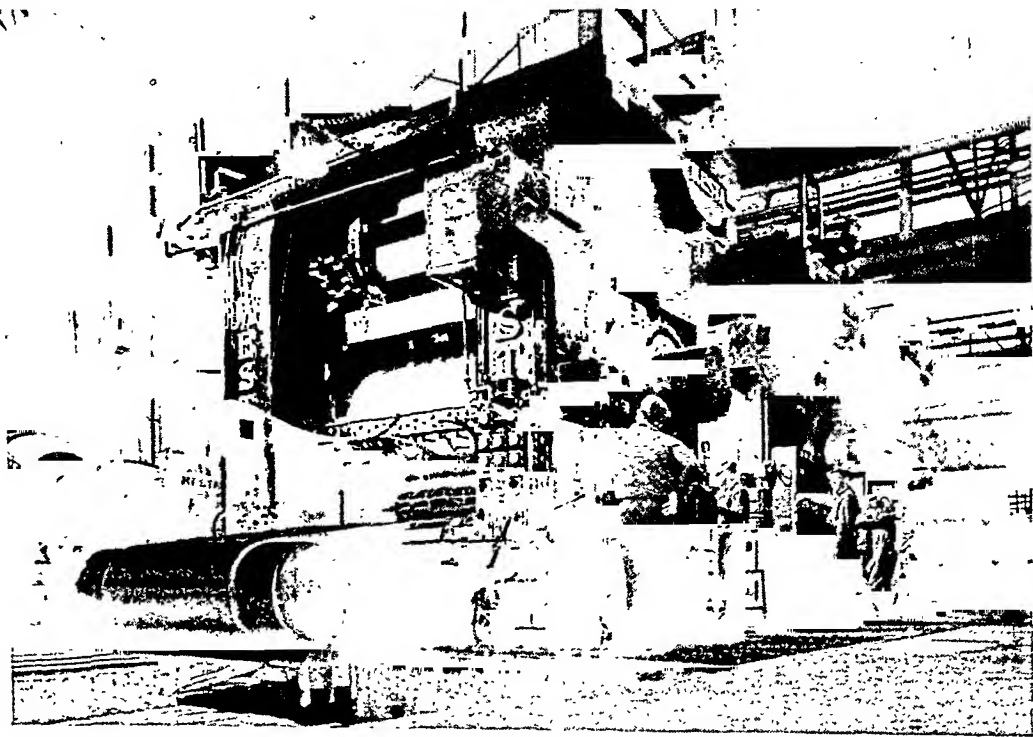
Slabs for the mill are furnished from the new blooming mill installed directly across the river. Railroad cars of special design are provided to transport the hot slabs across the river.

The slab is passed into one of three continuous heating furnaces at temperatures of 2,150–2,250° F. It then passes to the hot mill where the rolling begins; it is reduced in thickness and

the ultimate width of the finished product is established. At the end of this operation the slab is cut into sheets or rolled into coils.

In this mill there are also a blue annealing department, coil pickling building, cold rolling mill, box annealing furnaces, cold finishing operation, and a galvanizing department. This galvanizing unit is set up to handle sheets up to 60 inches wide and 180 inches long. Black sheets are given a coating of hot zinc and carefully inspected by trained operators.

Mellon Institute—This institution was founded in 1913 by Andrew W. Mellon and Richard B. Mellon to provide qualified research workers with facilities for investigating thoroughly



Some of the most important finishing operations of the J. & L. 96 inch continuous strip mill take place in the cold rolling department. In this department, the strip and sheets rolled on the hot mill are given another rolling or reduction which imparts to them the finest surface finish and the proper physical characteristics. Much of the steel rolled on this mill will ultimately be formed into automobile bodies, air conditioning equipment, stoves, refrigerators, and such other products which require highly finished surfaces. The mill above is the 93 inch three tandem, four-high cold rolling mill.



Activities in the biochemical laboratory of the Meat Merchandising Fellowship at Mellon Institute, following experimental tenderizing involving special attention to enzymes.

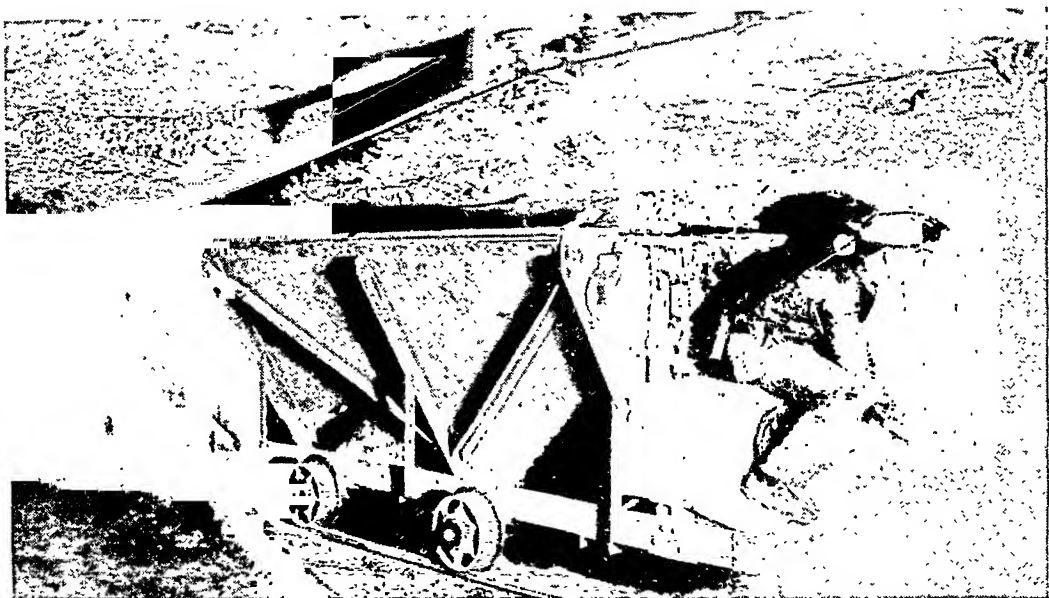
important problems of pure and applied science. The Institute is primarily concerned in carrying on broad studies of post-doctoral character supported by persons or organizations interested in these fields of research.

The Institute's many investigations in the realm of pure science include studies on urban smoke abatement and industrial dusts, a comprehensive research on sleep, an investigation of the cause and prevention of dental caries, a project to find a better way to diagnose tuberculosis in its early stages, and a search for new compounds of value in treating pneumonia.

The industrial research of the insti-

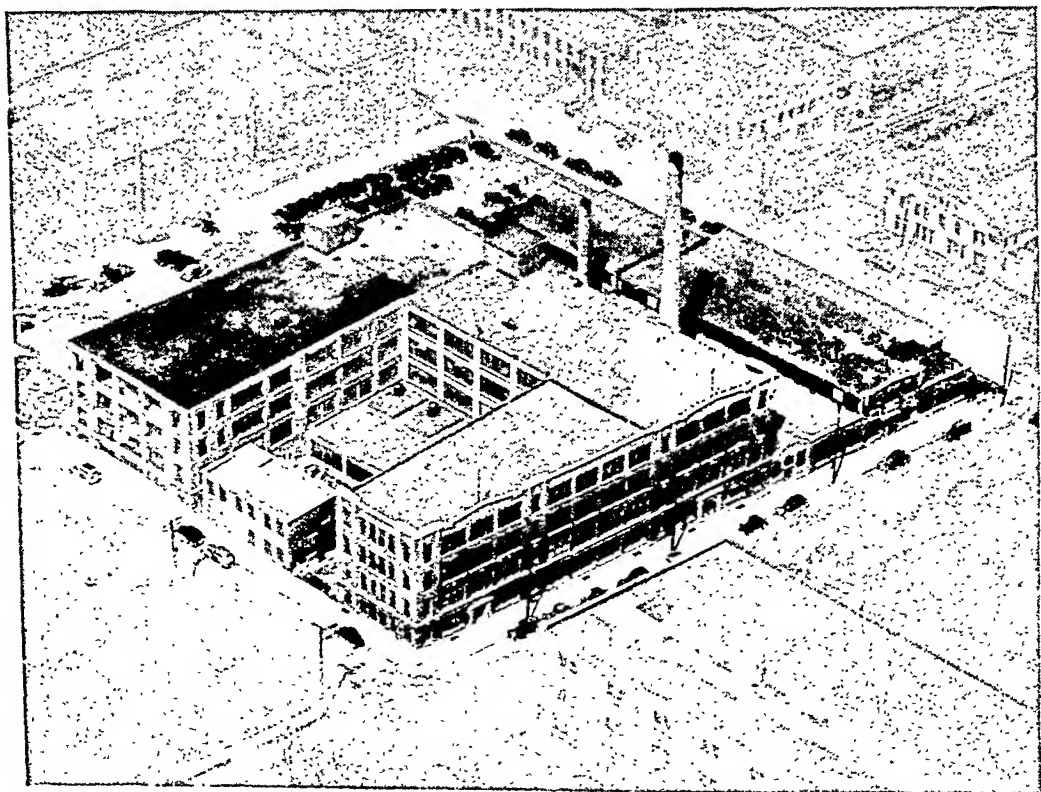
tution is organized on a contract basis. The problem is set by a person, firm, or association, the scientific worker is engaged by the Institute, and an Industrial Fellowship is assigned for a period of at least one year. Each incumbent of an Industrial Fellowship is given the broadest facilities for accomplishing a definite piece of research; all results obtained by him belong exclusively to the donor of the Fellowship. Only one investigation is carried out on a particular subject at any one time, and hence there is no duplication of the research activities of the Fellowships in operation.

At present 80 Fellowships are active,



Courtesy of U. S. Bureau of Mines

This is a rock dusting machine at work in a mine "spraying" limestone dust which helps prevent dust explosions. Limestone is an inert dust, not regarded as harmful to health.



A view of the plant of the Mine Safety Appliances Company.

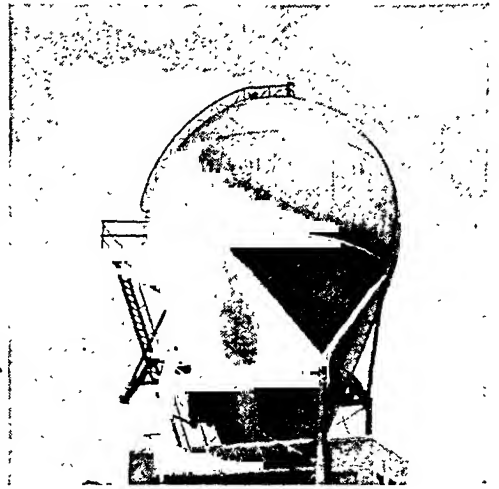
requiring the services of 240 scientists and engineers. During the 27 years since the foundation of the institution nearly 4,000 American companies have been served on problems ranging from glass and steel to food and textiles. The organization has evolved many novel products and processes, some of which have resulted in the formation of entirely new industries. Since 1911 more than \$13,000,000 has been contributed to the Institute by Industrial Fellowship donors.

In May, 1937, the Institute dedicated its new building, an imposing edifice whose most distinctive architectural feature is a colonnade of massive monolithic columns. The cubage of the structure is 6,500,000 cu. ft. It is one of the most beautiful and best equipped research laboratories in the world.

Tours through the building will cover all essential features of the institution, including its beautiful general rooms, its excellent technical library of 16,000 volumes, its efficient laboratories, and its engineering and development division. The trip will be made under trained guides who will describe in detail the operating principles of the Institute as well as the various research projects that are in operation.

Mine Safety Appliances Company—This is the largest manufacturing plant in the world devoted to the production of safety equipment. Originally founded to supply safety devices to the mining industry, it has pioneered in the development of a wide line of apparatus for general industrial safety. Much of this equipment is of considerable interest to public health officials, the medical profession, and specialists in the industrial hygiene field.

Gas and dust instruments form an interesting group of MSA products. By means of these instruments flammable or toxic gas concentrations can be detected and in some cases recorded.



The Westinghouse "Atom-Smasher" with which research physicists conduct experiments at the East Pittsburgh Laboratories in the field of nuclear physics.

Most of the long vehicular tunnels in this country use MSA instruments to sample continuously and control the carbon monoxide concentration. The MSA dust instruments and equipment, although on the market for only a short time, have found ready acceptance in mines and plants for the determination of dust in the atmosphere.

During the last few years the MSA Research Laboratories have made a study of silicosis and other respiratory diseases and means of protection against them. The result of this work is the MSA Comfo Respirator, the first dust respirator officially approved by the U. S. Bureau of Mines.

First aid training of mine and industrial workers has become quite common today, and MSA First Aid Equipment has gone hand in hand with the movement; special pocket packets, first aid cabinets of all kinds, stretchers, burn treatments, finger bandages, etc., are offered. One whole floor of the MSA plant is given over entirely to the manufacture of this type of material.

Other MSA equipment includes gas masks, breathing apparatus, head and eye protectors, and safety clothing.

Experimental Mine, U. S. Bureau of Mines—Thirteen miles from Pittsburgh is the Experimental Mine and Explosives Testing Station of the U. S. Bureau of Mines.

When the Bureau of Mines was organized in 1910, one of the important lines of investigation was the explosion of coal dust which had wrecked so many mines and killed so many men. To simulate actual conditions a tract of land underlaid with an undeveloped coal deposit was procured and the Experimental Mine was started.

The Mine consists of twin tunnels or entries driven in the coal for a distance of 1,300 feet, and two side entries in which rooms have been driven. Here actual explosions of coal dust are set off to show that rock dust is the most reliable means of preventing and controlling coal dust explosions. Here also explosives are tested for their value and permissibility in coal mine use.

Westinghouse Electric and Manufacturing Company—The Westinghouse Electric and Manufacturing Company is one of the most prominent in the electrical machinery field. Its products

are widely used in all parts of the world. The company's plant at East Pittsburgh occupies approximately 14,000,000 square feet and employs many thousands of people.

The public utility industry is dependent on Westinghouse Electric for machinery for production, transmission, and utilization of electric power. Besides this heavier equipment the company also produces a complete line of electrical appliances for home use.

The East Pittsburgh plant manufactures a plastic insulating material known as Micarta, which has found application in many other industries, such as greaseless bearings, tunnel linings, and in place of wood.

The research department has pioneered in the field of electricity and radio and now has its own four story building entirely separate from the rest of the plant. This department is now conducting an extensive search in radioactivity and the structure of the atom. The company is noted for its work in industrial hygiene. It maintains extensive medical facilities which include an industrial hygiene laboratory.

The Scientific Program

68th Annual Meeting—Pittsburgh

THE Pittsburgh Annual Meeting, the 68th, lies just ahead.

The Section Secretaries and the Program Committee are now ready, after weeks of preparation and planning, to announce the results of their efforts in program building. Their aim has been to present to the health workers who will gather in Pittsburgh the most significant and promising of the newer developments in health services for the public and to bring these selected topics forward under the best possible auspices.

The program has been developed primarily around the interests of the ten Sections of the Association. There are in addition attempts at general orientation with the contemporary public health scene and experimental reconnoiterings in borderlands not yet officially ceded to a public health protectorate.

A resumé of the program is given here in lieu of the usual listing of subjects and speakers.

ADVANCE MEETINGS

While the dates of the Annual Meeting are announced as October 17-20, the convention actually gets under way on Sunday morning, October 15, with the opening of the Sixth Institute on Public Health Education. Its theme is "Health Education for Three-thirds of a Nation." Dr. Ira V. Hiscock is Chairman and he has assembled a faculty representative of the most progressive thinking and performance in the field of mass education for

health. He is assisted by Drs. Gruenberg, Kleinschmidt, Galdston, Patterson, Gebhard, Bauer, Cornely, Otto, Baumgartner, Shepard, Derryberry, Halverson, Walker, Morgan, Turner, and Leavell; by Messrs. Grimley, McCandless, Widdemer, Resnick, Dent, Marquette, and Broughton; and by Miss Grout, Miss Connolly, Miss Shaw, Miss Strachan, Miss Harris, and Miss Davis.

Small discussion groups are emphasized on such subjects as the spoken word, the radio, the newspaper, printed matter, exhibits; motion pictures, personal contacts and visual methods, program planning, school health education. There is a general session on how to reach professional, lay and student groups; one on how to appraise health education content and materials; one on organizing a coördinated health education program.

The Institute runs all day Sunday, all day Monday, and Tuesday morning. It is open to anyone engaged in or interested in health education. The registration fee is \$3.00 for Association members and \$6.00 for all others. The complete program is available on request to the Association office.

The International Society of Medical Health Officers will sponsor an Institute for Health Officers on Monday, October 17, with morning and afternoon sessions devoted to informal discussion of practical administrative problems. They join the students and faculty of the Health Education Institute at luncheon, and they have

planned a dinner for that evening with accent upon fun and sociability.

Five Conference groups will meet on Monday: State Laboratory Directors, State Sanitary Engineers, Municipal Public Health Engineers, Directors of Local Health Service and State Directors of Public Health Nursing.

The Association of Women in Public Health will hold a meeting Monday morning to consider the opportunities open to women planning a public health career. This will be followed by a luncheon, open to the public, with a well known newspaper man and an outstanding educator as speakers.

The National Organization for Public Health Nursing is joining with the American Public Health Association at its Annual Meeting, celebrating this event with a dinner on Monday evening. Dr. Winslow presides and Katharine Tucker speaks on "Preparation for Public Health Nursing—How, Where, When?"

The American School Health Association must be listed among advance meetings because its first and second sessions are held on Monday, although it continues throughout the week with joint meetings with Association Sections, sponsors a luncheon session on tuberculosis on Thursday, a session on school health policies on Thursday afternoon, and winds up on Friday morning with a summary of the special contributions of the 68th Annual Meeting to the school health program.

This Association's Monday afternoon program offers J. Louis Neff speaking on medical resources for the care of school children and Mellie F. Palmer, R.N., with the provocative title "Coöperative-Planning—A Dynamic for School Nursing." The Monday evening meeting presents Dr. B. B. Bagley, Dr. Fredrika Moore, and Dr. Helen A. Cary. Dr. Bagley answers the question "How can the state department help improve school health

procedures?" Dr. Moore indicates what should be attempted in school health work on a limited budget and Dr. Cary explains the part of the school physician in effective follow-up.

GENERAL SESSIONS

Six opportunities for entire Association participation are provided this year with programs that cut across all Section boundaries and that are of interest and concern to every member and guest.

Two evening general sessions are scheduled. On Tuesday evening, Dr. Edward S. Godfrey, Jr., will present his Presidential Address. The second speaker, Dr. Milton J. Rosenau, inaugurates the Delta Omega Lectureship with a philosophical essay entitled "New Lamps for Old." The second evening general session will be held on Thursday in the form of the Annual Banquet.

A session on Medical Care has been arranged for Wednesday afternoon with discussions on medical care as a welfare function and as a public health function.

On Wednesday, Thursday, and Friday mornings, Section meetings will be dismissed at 11:15 to permit attendance at general sessions of one hour duration. The subjects considered by the Program Committee of sufficient importance to engage the attention of all delegates are "The American Way as Seen from Abroad" with contributions from distinguished visitors from overseas, "Cancer," and "Professional Education."

JOINT SESSIONS

The Child Hygiene and Public Health Nursing Sections and the American School Health Association come together to consider the physical and emotional development of the adolescent with the implications that each has for the general health program and the

school health program. William Greulich, Ph.D., Caroline Zachry, and Lawrence K. Frank are the speakers, with the nursing interests represented by Hortense Hilbert, R.N.

The Child Hygiene Section figures also in a joint meeting on dental health with the American School Health Association and the Oral Health Group and further with the Public Health Education Section and the American School Health Association in a session on "The Educational Psychology Underlying the Motivation of the Individual." This is attacked at the elementary school level by Dr. James F. Rogers, at the secondary school level by Philip L. Riley, and at the adult level by Raymond H. Greenman.

The Health Officers and the Industrial Hygiene Sections sponsor a symposium on illness in industry and its control. Dr. C. H. Kibbey tells of a quarter century with an industrial health department; Dr. Anthony J. Lanza talks on tuberculosis in industry; Dr. Clarence D. Selby shows how industry can approach adult health problems, and Dr. Carl A. Wilzbach contributes a paper on the control of syphilis in industry.

The administrators collaborate with the educators in one session, the Health Officers represented by Dr. I. C. Riggins and Dr. George T. Palmer, the Public Health Education Section by Professor C. E. Turner, Savel Zimand, and Dr. Leona Baumgartner.

Pneumonia receives attention at the hands of the Health Officers and the Epidemiology Sections in a symposium in which Dr. Lloyd D. Felton, Dr. Wheelan D. Sutliff, Dr. Wilson G. Smillie, and Dr. Ernest L. Stebbins are taking part.

Miscellaneous problems which depend for their solution upon coöperation between the health officer and the public health engineer, such as hygiene of swimming, restaurant sanitation, and

automatic control of pasteurization, are considered in a joint session of the Health Officers and Public Health Engineering Sections. The speakers are Dr. H. Marshall Long, H. H. Wagenhals, A. W. Fuchs, and Sol Pincus.

The engineers hold their customary joint session with the Conference of State Sanitary Engineers. The subjects include training of water works operators, standards for bathing places, sanitary land-fills, the National Plumbing Laboratory, and functions of public health engineering personnel, with speakers as follows: Anselmo F. Dappert, Warren J. Scott, Lewis V. Carpenter, Francis M. Dawson, and Roy J. Morton.

A symposium on engineering problems in industrial hygiene involves the engineers and the industrial hygienists. B. F. Postman discusses exhaust ventilation and occupational exposures; J. M. Dalla Valle, M.D., voices the principles of industrial sanitation; J. M. Graves, M.D., suggests methods for integrating industrial hygiene with local health service, and W. Scott Johnson proposes an administrative approach to the engineering phases of industrial hygiene.

The Laboratory and Food and Nutrition Sections combine once for a consideration of food poisoning with such experts on the platform as Fred W. Tanner, T. D. Nunheimer, and Glenn G. Slocum, and again in a session on dairy products where the methylene blue and the Resazurin tests are compared for results, constant temperature incubation in milk control work is stressed, and pasteurization efficiency is examined. Lawrence Little, Robert S. Breed, Ph.D., Harold W. Leahy, Harry Scharer, and E. H. Parfitt appear on this program.

Gastroenteritis is given an entire session by the Laboratory and Epidemiology Sections. The newer knowledge of bacillary dysentery and other

intestinal infections is summarized by Joseph Felsen, M.D. An outbreak of Shiga dysentery and outbreaks of gastroenteritis of unknown etiology are described respectively by Berneta Block, M.D., and Millard Knowlton, M.D. Albert V. Hardy, M.D., has a paper on the "Newcastle Dysentery Bacillus" and Marion B. Coleman one on differentiation and identification of bacillary incitants of dysentery.

The Food and Nutrition and Child Hygiene Sections and the American School Health Association spend a half-day on the subject of nutrition. William Schmidt, M.D., George M. Wheatley, M.D., Lynda M. Weber, and C. C. Hudson, M.D., are among the names on this program. Their presentations deal with the appraisal of nutritional status by newer medical methods, the care of undernourished children, teaching nutrition in high schools, and the school lunch.

THE SECTION PROGRAMS

The 12 joint and 6 general sessions already described and the many advance meetings would seem to offer a full week's work for the avid seeker after knowledge. The independent meetings of the ten Sections provide competition of high order, however, and offer opportunities for the specialist to get down to fundamentals.

Health Officers. "Promising Additions to Health Department Programs," "Personnel Problems," and "Venereal Diseases" are the titles of the three independent sessions of this Section.

In the first, Drs. J. N. Baker, K. E. Miller, George C. Ruhland, and Ralph C. Williams discuss respectively farm and home accidents, advertising control of foods, drugs, cosmetics and devices, hospitals in a public health program, and medical care plans for low income farm families.

In the second, prevailing employment policies in health departments are

summarized by Dr. M. V. Zeigler, personnel administration under civil service is described by Dr. George T. Palmer, lessons that may be learned from personnel administration in industry are pointed out by S. J. Fosdick, and Dr. Mayhew Derryberry reports on a study of educational qualifications of staff members in health departments.

The symposium on venereal diseases has as its contributors Dr. Nels A. Nelson, Dr. John H. Stokes, Mary Hooke Goodwin, Dr. P. S. Pelouze, and Dr. Theodore Rosenthal. Their subjects, in the order of the speakers listed, are: Why don't we stamp out gonorrhea?; A study of consultation on syphilis by correspondence; The advantage of the family clinic in the prevention and control of syphilis; The control of gonococcal infection and syphilis among domestic servants.

Laboratory. The first session is given over to reports of Standard Methods Committees. The Laboratory Section is the breeding ground for some of the most significant of the Association's work and these reports of research accomplished and in progress have important implications for all health workers. They include water and sewage, dairy and food products, diagnostic procedures and reagents, biology of the laboratory animal, frozen deserts, biological products, and shellfish.

One session is devoted to the newer venereal diseases. Dr. E. S. Sanderson describes the laboratory aspects of chancroid, granuloma venereum and lymphogranuloma venereum, and Dr. Fred Wise discusses and illustrates the differential diagnosis of these diseases. Dr. Joseph R. D'Aunoy gives detailed consideration to the last named, and Dr. Robert B. Greenblatt takes the broad view in a paper on aspects of all the newer venereal diseases.

The biology of the laboratory animal receives attention at the hands of Dr. R. G. Daggs, Dr. Gregory Pincus, Dr.

Paul B. Sawin, Dr. Paul A. Moody, Dr. Norman J. Pyle, Captain Ralph W. Mohri, and Lt. Col. Raymond A. Kelsner.

Two sessions of miscellaneous titles complete the Laboratory program. The papers deal with reasonably priced incubators, rabies, gonococcus carriers, effect of chemical antiseptics on phagocytosis, heat resistance of streptococci, oral contamination of drinking glasses, slow lactose fermenting coliform organisms, *E. typhosus* in soils, laboratory diagnosis of enteric diseases, and toxicity of basic fuchsin for certain diseases. The speakers are: Lt. Col. A. Parker Hitchens, Dr. Charles N. Leach, Dr. Charles M. Carpenter, Dr. Henry Welch, Dr. Edward C. Rosenow, Leo Dick, Dr. Charles A. Stuart, Dr. Paul J. Beard, Dr. Joseph A. Kasper, Catherine Mayfield, and Cassandra Ritter.

Vital Statistics. Four independent meetings containing a total of twenty papers and reports reveal the present interests of statisticians. Five papers are grouped in a symposium on the coördination of vital statistics with the expanding programs for social welfare. They cover record keeping for venereal diseases; hospital morbidity reporting; statistical needs of maternal and child health organizations as related to county and state programs; the relationship of the work of the Social Security Board to that of the state, city and local registrars, and the broader aspects of the coördination of vital statistics with the expanding programs for social welfare. Lida J. Usilton, Dr. Helen Jeter, Dr. Edwin F. Daily, Willard C. Smith, and Dr. Lowell J. Reed are the speakers.

Other topics and speakers are: Exhibit technics in vital statistics at the New York World's Fair, Jacob Baar; Publicity in promoting registration of births and deaths, Dr. Martin B. Woodward; Educating medical students

and others concerned with registration data, I. C. Plummer; Reflections on fatality rates for reported cases of tuberculosis, Dr. Gaius E. Harmon; Evaluation of the Massachusetts state-aided cancer clinics, Eleanor J. MacDonald; Tabulating associated causes of death, Theodore A. Janssen; Experiences with the new forms of certificates, Thomas W. Chamberlain; Reliability of statistics on cause of death, Robert G. Webster; Plans for the 1940 census, Dr. Leon E. Truesdell; and Utilizing vital statistics in the public health program, Dr. Floyd P. Allen.

Public Health Engineering. The many joint meetings with which the engineers are concerned this year have limited their individual meetings to two. The Committees on Sewage Disposal and Shellfish, Chairmanned respectively by Langdon Pearse and L. M. Fisher, are reporting. Some observations on sanitary land-fills are made by Lewis V. Carpenter; Measures instituted for the control of *Aedes aegypti* are announced by James H. LeVan; A typhoid fever outbreak caused by "bootleg" oysters is reported by H. N. Old; The relationship of stream pollution abatement to Pittsburgh's water supply and health is traced by Dr. Chester F. Drake; The water pollution research program of the U. S. Public Health Service is reviewed by John K. Hoskins; and Certain aspects of governmental policy on stream pollution abatement are discussed by Dr. Herman G. Baity.

The Stag Dinner, social event of the meeting for engineers, will be held on Wednesday evening.

Industrial Hygiene. This Section is celebrating the 25th anniversary of its founding with a Silver Jubilee Dinner on Wednesday evening which promises to be a high spot socially, historically, and scientifically.

A luncheon session, at which Dr.

Henry Field Smyth, Sr., and Dr. Henry Field Smyth, Jr., will present reports of the Committees on Industrial Anthrax and Volatile Solvents, is of interest.

A symposium on field methods for rapid determination of air contaminants, with Dr. H. H. Schrenk specializing on dusts, Philip Drinker on vapors, and F. A. Patty on gases, is scheduled.

Other speakers listed are J. J. Bloomfield, Glenn S. Everts, Dr. Shirley W. Wynne, Dr. Robert H. Flinn, Theodore F. Hatch, and M. F. Trice. Their names follow the subjects: Address of the Chairman, Industrial hygiene for the smaller plant, Hearing and noise in industry, The dust problem in the pottery industry, The control of dust in rock drilling operations, and The dust hazard and its control in the foundry industry.

Food and Nutrition. Three individual sessions and a luncheon are planned.

Packaging of food products is approached from three standpoints. Dr. J. Raymond Sanborn takes the microbiological examination and standardization of paper wrappers and containers; Dr. Evan Wheaton the bacteriological problems relating to foods packed in paper containers; and the Committee on Milk and Dairy Products, Merrill J. Mack, Chairman, makes its report on the sanitary aspects of packaging milk and milk products.

Foods frozen in cold storage lockers and farm freezers are considered by the Committee on Foods, Dr. Donald K. Tressler, Chairman.

The new Food, Drugs and Cosmetic Act and its public health implications is the contribution of Walter S. Frisbie; Dr. Abraham Lichterman has a paper on trichinosis and its control; and William G. Walter one on distintegration methods for the bacterial examination of meat.

Milk figures prominently in several

presentations. Nutritive and economic values of skim milk, economical milk products in human nutrition, and recent investigations of goat's milk are three papers to be read respectively by J. S. Abbot, Dr. Marietta Eichelberger, and Dr. Arthur K. Besley. The Burri Smear culture technic is described by Dr. B. W. Hammer.

The Oral Health Group as well as the Food and Nutrition Section will be interested in Dr. Mark Elliott's study on retardation of dental caries by dietary supplement and Dr. C. G. King's work on the effects of vitamin C intake upon tooth injury produced by diphtheria toxin.

Helen N. Church surveys the public health nutrition service in the United States; Dr. Walter H. Eddy asks what evidence there is of vitamin deficiency in the diet of the American people; Dr. Wilton L. Halverson talks on nutritional deficiencies in community groups with particular reference to vitamin B; and Dr. Morris Ant on the interpretation of nutritional factors in treating disease.

The luncheon session is devoted to reports of committees.

Child Hygiene. Experiences in rendering an obstetric delivery service in a rural area, stillbirths and neonatal deaths, a health department birth control program, a study of bacillary dysentery in rural areas, promotion of mental health, the development of a health education program, and advances made in the Federal program for the care of crippled children are subjects the Child Hygiene Section will cover in its two independent sessions and a luncheon meeting. The speakers are not yet announced, except for Dr. James Watt, who will present the dysentery paper.

Public Health Education. This Section announces frankly that its first session has been arranged particularly for new workers in the health education

field. The subject is equally frank—A reëvaluation of health education media. The debunkers are: Philip S. Broughton, who takes Printed Materials, Effective and Otherwise; Kenneth W. Grimley, with Newspapers and Magazines—Is Health News Fit To Print? Sally Lucas Jean, on Visual Aid Advances; Dr. W. W. Bauer, with Public Meetings—Are They Worth While? and Joseph Ries, with The Health Educator on the Radio.

"Frontiers in Medical Research and Advances in Science as they pertain to Health Education" is the title of the second session. Chemotherapy, mental hygiene, virus diseases, nutrition, and school dental health education are selected for this special attention; and the speakers, in the same order, are Dr. Jesse G. M. Bullowa, Dr. Emerson North, Dr. Ralph S. Muckenfuss, Dr. C. G. King, and Dr. Florence B. Hopkins.

The status, plans, and policies of the Section will be discussed at a dinner meeting. One luncheon is scheduled with Dr. Owsei Temkin speaking on the subject "Health Education Through the Ages."

Epidemiology. Four individual sessions with a wide range of topics are planned. Dr. Harold W. Brown presents the problem of malaria mortality, and Dr. Harry Most presents studies on malignant malaria in drug addicts. Dr. Thomas B. Turner calls attention to the factors which influence the interpretation of discovery rates in syphilis.

There are addresses by Drs. Donald T. Fraser, William Grossman, J. A. Doull, D. G. Gill, Martin Frobisher, Jr., Ernest L. Stebbins, and G. Foard McGinnes on the important diphtheria carrier survey.

Drs. Miriam Brailey, George W. Weber, and L. L. Lumsden are responsible for three tuberculosis papers entitled respectively "A Study of Mortality in the Children of Tuberculosis

Households," "Tuberculosis in a Controlled Environment," and "Epidemiological Studies of Tuberculosis."

The epidemiology of "San Joaquin" or "Valley Fever" is described by Dr. Charles Edward Smith, of anthrax in North Dakota by Dr. John A. Cowan, and of three outbreaks of infectious jaundice by Dr. John J. Shaw. Jaundice in Detroit engages Dr. J. G. Molner; tick paralysis, Dr. R. B. Jenkins; and the modes of spread of respiratory infections, William F. Wells.

Public Health Nursing. The first of the two sessions on this program is devoted to reports of committees plus a discussion by Frances R. Pratt of the staff education programs for public health nurses developed by the North Carolina State Board of Health. The Committees reporting are: Relationships between official and non-official public health nursing agencies, Julia L. Groscop, Chairman; Industrial Nursing in and around Pittsburgh, Helen V. Stevens, R.N., Chairman; and Subcommittee on Public Health Nursing of the Committee on Administrative Practice, Marion W. Sheahan, R.N., Chairman. Brief reports of representatives of the Public Health Nursing Section on Association Committees are also scheduled.

The second session lists Reba F. Harris for a paper on coördination of educational programs for all health workers, Anna Heisler, R.N., and Beryl Lussow, R.N., presenting respectively the rural and city agency viewpoint on the continuous educational program which supervision of public health nurses is. Dr. Iago Galdston discusses "Changes in Public Health Nursing Functions as a Result of New Medical Discoveries."

Dr. Edward S. Godfrey, Jr., is the speaker at a luncheon session. His subject is "Relation of the State Division of Public Health Nursing to Local Agencies."

OTHER MEETINGS

During the week numerous administrative and technical committees and other groups will meet. Many are holding breakfast, luncheon, or dinner conferences. An event of special importance is the dinner of the Pennsylvania Public Health Association on Wednesday evening, to be followed by a meeting to which the public is invited. The speakers scheduled for this meeting are Dr. Henry F. Vaughan

and Dr. Arthur T. McCormack.

It is to be emphasized that the foregoing is a summary of the scientific program. For the sake of brevity, titles are shortened in most instances and sometimes rephrased. Names of collaborating authors are omitted. The final and official program, to be distributed at the Registration Desk in Pittsburgh, will give full credit to co-authors and will report titles accurately and completely.

ASSOCIATION NEWS

SIXTY-EIGHTH ANNUAL MEETING

Pittsburgh, Pa., October 17-20, 1939

HEADQUARTERS — HOTEL WILLIAM PENN

RAILROAD FARES FROM VARIOUS POINTS TO PITTSBURGH, PA.

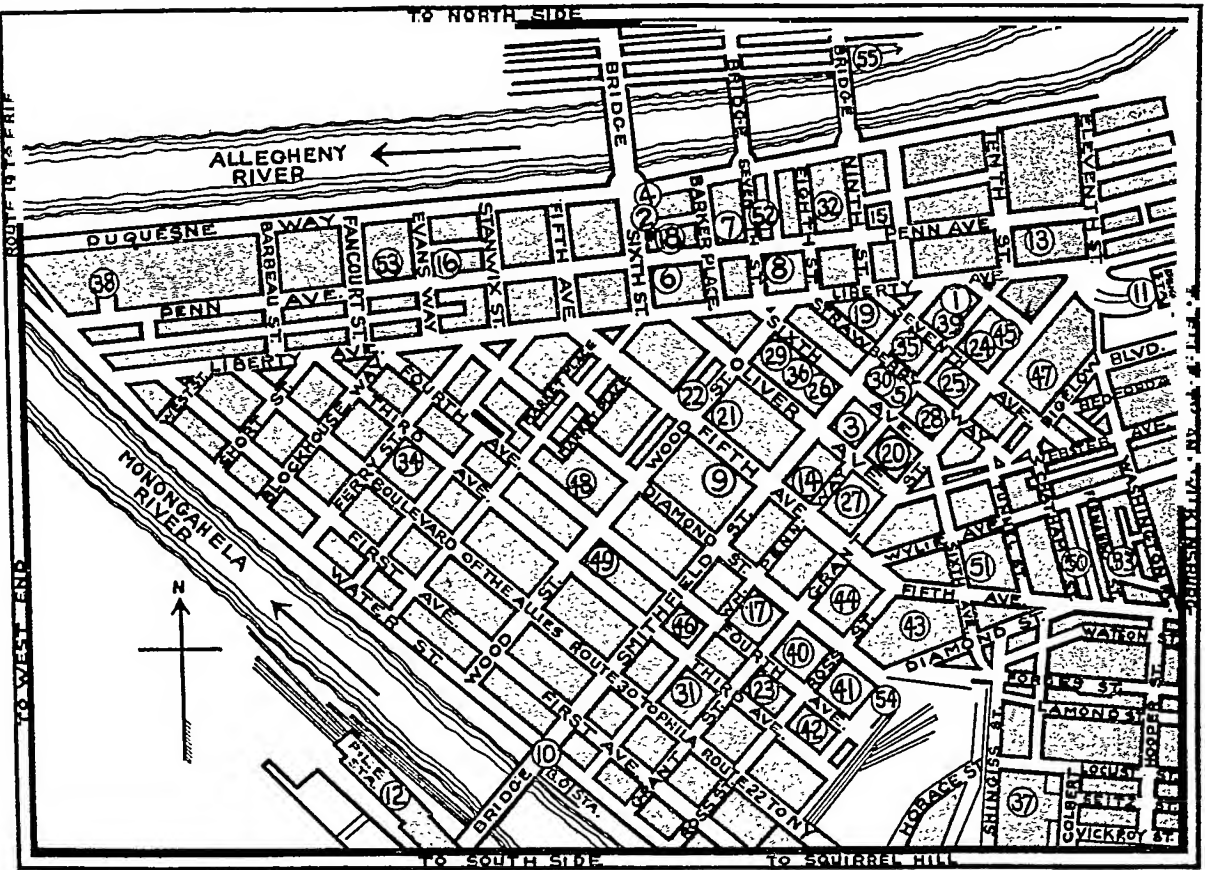
AMERICAN PUBLIC HEALTH ASSOCIATION
OCTOBER 17-20, 1939

<i>From</i>	<i>One-way Pullman Travel</i>	<i>Round-trip Pullman Travel</i>	<i>One-way Lower</i>	<i>One-way Upper</i>
Atlanta, Ga. ¹	\$23.75	\$42.50	\$5.80	\$4.40
Baltimore, Md.	9.05	18.10	2.65	2.00
Boston, Mass.	20.10	40.20	4.50	3.40
Buffalo, N. Y.	7.75	15.50	2.65	2.00
Chicago, Ill.	14.10	28.20	3.15	2.40
Cleveland, Ohio	3.95	7.90	2.10	1.60
Dallas, Tex.	38.24	64.50	10.00	7.60
Denver, Colo.	45.16	74.80	10.80	8.20
Detroit, Mich.	8.85	17.70	2.65	2.00
Duluth, Minn.	27.77	48.75	6.30	4.80
Fort Worth, Tex.	38.24	65.80	10.00	7.60
Indianapolis, Ind.	11.15	22.30	3.15	2.40
Jacksonville, Fla. ²	32.76	57.60	8.40	6.40
Kansas City, Mo.	26.90	48.90	6.30	4.80
Louisville, Ky.	12.80	25.60	3.15	2.40
Los Angeles, Calif.	79.65	118.50	19.70	15.00
Memphis, Tenn. ¹	24.20	43.40	6.30	4.80
Milwaukee, Wis.	16.65	32.05	3.15 ³	2.40
Minneapolis, Minn.	26.31	46.55	5.80	4.40
Nashville, Tenn. ¹	18.52	33.75	4.50	3.40
New Orleans, La. ¹	34.50	58.30	8.40	6.40
New York, N. Y.	13.15	26.30	3.15	2.40
Omaha, Nebr.	29.01	50.65	6.30	4.80
Philadelphia, Pa.	10.45	20.90	2.65	2.00
Portland, Ore.	78.44	118.50	19.70	15.00
Salt Lake City, Utah	58.89	87.55	13.95	10.60
San Francisco, Calif.	79.65	118.50	19.70	15.00
Seattle, Wash.	78.44	118.50	19.70	15.00
St. Louis, Mo.	18.55	37.10	4.50	3.40
Washington, D. C.	9.05	18.10	2.65	2.00
Montreal, Que. ⁴	21.00	42.00	5.55	4.20
Halifax, N. S. ⁴	41.95	83.90	9.30	8.00
Ottawa, Ont. ⁴	20.00	40.00	5.55	4.20
Quebec, P. Q. ⁴	26.65	53.30	5.55 ⁵	4.20
Toronto, Ont. ⁴	11.50	23.00	2.65 ⁶	2.00
Vancouver, B. C.	78.44	118.50	19.70	15.00

1. Via Cincinnati
2. Via Washington
3. Pullman to Chicago only

4. Via Buffalo
5. Pullman to Montreal only
6. Pullman to Buffalo only

THE GOLDEN TRIANGLE PITTSBURGH, PA.



Courtesy of This Week in Pittsburgh

SHOWN ON THE MAP

THEATERS

- 1—Senator
- 2—Alvin
- 4—Fulton
- 5—Nixon
- 6—Penn
- 7—Barry
- 8—Stanley
- 9—Warner
- Art Cinema (Liberty & Eighth St.)

RAILROAD STATIONS

- 10—Baltimore & Ohio
- 11—Pennsylvania
- 12—Pgh. & Lake Erie
- 54—Fourth Ave. Station

HOTELS

- 13—Fort Pitt
- 17—Pittsburgher

- 18—Roosevelt
- 20—William Penn
- Keystone, Wood Street

PRINCIPAL BUILDINGS

- 21—Farmers Bank
- 22—First National Bank
- 23—Grant
- 24—Gulf
- 25—Koppers
- 26—Oliver
- 27—Union Trust
- 55—Heinz Plant
- Jenkins Arcade (Liberty & Penn)

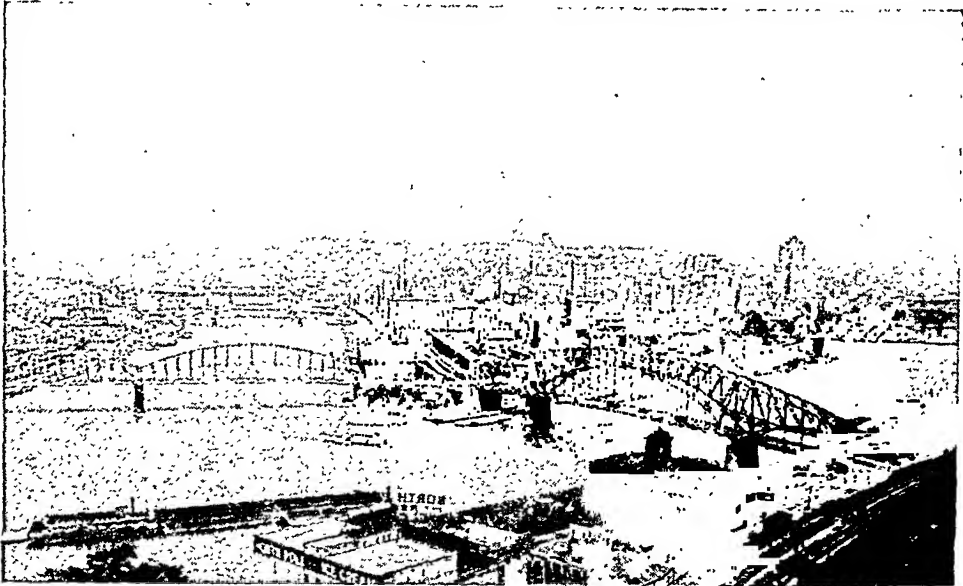
CHURCHES

- 28—First Lutheran
- 29—First Presbyterian
- 30—German E. P.
- 31—Salvation Army

- 32—Second Presbyterian
- 33—St. Peter's
- 34—St. Mary's Catholic
- 35—Smithfield M. E.
- 36—Trinity

PUBLIC BUILDINGS

- 37—Duquesne University
- 38—Block House
- 39—Chamber of Commerce
- 40—City-County
- 41—New County
- 42—County Morgue
- 43—County Jail
- 44—Court House
- 45—Federal Reserve
- 46—Old U. S. Post Office
- 47—New U. S. Post Office
- 48—Pgh. Stock Exchange
- 49—Y.M.C.A.
- 50—Y.W.C.A.



“The Golden Triangle” and the “Point.” The junction of the Allegheny and Monongahela Rivers to form the Ohio

PITTSBURGH HOTELS

Hotel	Room Capacity	Single Room		Double Room	
		Without Bath	With Bath	Without Bath	With Bath
William Penn Hotel	1,800		\$3.50-\$5.00		\$5.00-\$8.00
Roosevelt Hotel			2.50- 3.00		4.00- 4.50
The Pittsburgher	400		3.00- 4.00		4.50- 6.00
Hotel Schenley			3.50- 4.50		6.00- 8.00
Hotel Fort Pitt		\$1.50-\$2.00	2.50- 3.50	\$3.00	3.50- 6.00
Hotel Webster Hall	600	\$2.00	2.50- 3.50		5.00- 7.00
Hotel Keystone			2.50- 3.00		4.00- 7.00

.....(Cut off on this line and mail to the hotel of your choice).....

HOTEL RESERVATION BLANK FOR THE PITTSBURGH MEETING
AMERICAN PUBLIC HEALTH ASSOCIATION
OCTOBER 17-20, 1939

To
(Name of Hotel)

Please reserve for me rooms for persons
for the A.P.H.A. Meeting.

Single room Double room
Maximum rate per day for room \$. Minimum rate per day for room \$.

I expect to arrive If date of arrival is changed I will notify
you at least 24 hours in advance.

Please acknowledge this reservation.

Name

Street address

City State

NOMINATIONS FOR THE GOVERNING COUNCIL

IN accordance with the By-laws of the Association, the Nominating Committee reports the following nominations for the Governing Council. The Constitution provides that "upon the petition of twenty-five Fellows, the Nominating Committee shall add the name of any Fellow to this list, providing such petition is received fifteen days before the Annual Meeting." The *Chairman* of the Committee is Dr. John J. Sippy, San Joaquin Local Health District, Stockton, Calif.

The ten Fellows receiving the highest number of votes on a written ballot cast by the Fellows present and voting at the Annual Meeting in Pittsburgh, Pa., will be elected for the three year term 1939-1942.

Gaylord W. Anderson, M.D.
University of Minnesota
Minneapolis, Minn.

J. N. Baker, M.D.
State Health Officer
Montgomery, Ala.

J. Howard Beard, M.D.
University of Illinois
Urbana, Ill.

Malcolm R. Bow, M.D.
Deputy Minister of Health
Edmonton, Alberta, Canada

Selwyn D. Collins, Ph.D.
U. S. Public Health Service
Washington, D. C.

George B. Darling, Dr.P.H.
W. K. Kellogg Foundation
Battle Creek, Mich.

Robert D. Defries, M.D.
Connaught Laboratories and School of Hygiene
Toronto, Ontario, Canada

J. Clarence Funk, Sc.D.
State Department of Health
Richmond, Va.

Hugh N. Heffernan
State Board of Health
New Orleans, La.

Anna Heisler, R.N.
U. S. Public Health Service
San Francisco, Calif.

A. Parker Hitchens, M.D.
University of Pennsylvania
Philadelphia, Pa.

A. J. Lanza, M.D.
Metropolitan Life Insurance Company
New York, N. Y.

Karl F. Meyer, Ph.D.
Hooper Foundation
University of California
San Francisco, Calif.

Hugo Muench, Jr., M.D.
Rockefeller Foundation
New York, N. Y.

Harry S. Mustard, M.D.
New York University College of Medicine
New York, N. Y.

Bernard E. Proctor, Ph.D.
Massachusetts Institute of Technology
Cambridge, Mass.

Domingo F. Ramos, M.D.
Instituto Finlay
Havana, Cuba

George H. Ramsey, M.D.
Westchester County Department of Health
White Plains, N. Y.

W. S. Rankin, M.D.
Duke Endowment
Charlotte, N. C.

Robert H. Riley, M.D.
State Department of Health
Baltimore, Md.

Anna E. Rude, M.D.
Los Angeles County Health Department
Los Angeles, Calif.

Dean Franklin Smiley, M.D.
Cornell University
Ithaca, N. Y.

Elizabeth C. Tandy, D.Sc.
Children's Bureau
U. S. Department of Labor
Washington, D. C.

L. R. Thompson, M.D.
National Institute of Health
Washington, D. C.

Elnora E. Thomson, R.N.
University of Oregon Medical School
Portland, Ore.

Felix J. Underwood, M.D.
State Health Officer
Jackson, Miss.

W. Frank Walker, Dr.P.H.
Commonwealth Fund
New York, N. Y.

H. A. Whittaker
State Board of Health
Minneapolis, Minn.

Robert E. Wodehouse, M.D.
Department of Pensions & National Health
Ottawa, Ont., Canada

Hans Zinsser, M.D.
Harvard Medical School
Boston, Mass.

APPLICANTS FOR FELLOWSHIP

In accordance with the By-laws of the Association, the names of applicants for Fellowship are officially published herewith. They have requested affiliation with the Sections indicated. Action by the various Section Councils, the Committee on Eligibility, and the Governing Council will take place between now and the time of the Pittsburgh Annual Meeting.

Health Officers Section

Joseph I. Linde, M.D., Health Officer, New Haven, Conn.

Laboratory Section

Natale Colosi, Ph.D., Director of Laboratories and Supt., Parkway Hospital, New York, N. Y.

Elizabeth J. Cope, B.S., Bacteriologist, Department of Health, Detroit, Mich.

George McL. Lawson, M.D., Dr.P.H., Professor of Preventive Medicine and Bacteriology, Department of Medicine, University of Virginia, Charlottesville, Va.

Stuart Mudd, M.D., Professor of Bacteriology, University of Pennsylvania Medical School, Philadelphia, Pa.

George T. Stevens, Director, Clinical Laboratory, U. S. Marine Hospital, San Francisco, Calif.

Vital Statistics Section

Sterling S. Cook, M.D., Dr.P.H., Chief of Medicine, Norfolk Naval Hospital, Portsmouth, Va.

Halbert L. Dunn, M.D., Ph.D., Chief, Division of Vital Statistics, Bureau of the Census, Washington, D. C.

Albert G. Love, M.D., Dr.P.H., Vital Statistical Division, U. S. Army, Washington, D. C.

John T. Marshall, Director, Division of Vital Statistics, Provincial Board of Health, Victoria, B. C., Canada

John R. Miner, Sc.D., Associate Editor, Mayo Clinic, Rochester, Minn.

Leonard V. Phelps, S.B. in P.H., Director, Bureau of Vital Statistics, State Department of Health, Montgomery, Ala.

Ruth R. Puffer, A.B., Statistician, State De-

partment of Public Health, Nashville, Tenn.
Franklin H. Reeder, M.B., Ch.B., State Registrar of Vital Statistics, State Health Department, Charleston, W. Va.

Lida J. Usilton, A.M., Senior Statistician, U. S. Public Health Service, Washington, D. C.

John M. Wheelis, Jr., M.D., Dr.P.H., Medical Officer, U. S. Navy, San Pedro, Calif.

Richard N. Whitfield, M.D., State Director of Vital Statistics, State Board of Health, Jackson, Miss.

Jacob Yerushalmy, Ph.D., Statistician, National Institute of Health, U. S. Public Health Service, Bethesda, Md.

Industrial Hygiene Section

Warren A. Cook, A.B., Division of Industrial Hygiene and Engineering Research, Zurich General Accident and Liability Insurance Company, Chicago, Ill.

Charles C. Dills, M.S., Industrial Hygiene Engineer, State Board of Health, Lawrence, Kans.

Henry F. Smyth, Jr., Ph.D., Industrial Fellow, Mellon Institute of Industrial Research, Pittsburgh, Pa.

Food and Nutrition Section

William F. Reindollar, Sc.D., Chief, Bureau of Chemistry, State Department of Health, Baltimore, Md.

Child Hygiene Section

Adrian L. Carson, Jr., M.D., Assistant Director, Bureau of Maternal and Child Health, State Department of Health, Richmond, Va.

Edwin F. Daily, M.D., Director, Maternal and Child Health Division, Children's Bureau, Washington, D. C.

Public Health Education Section

Claude W. Chamberlain, Ph.D., Supervisor of Health Education, State Department of Public Health, Springfield, Ill.

William W. McFarland, M.D., Executive Director, General Health Council, Pittsburgh, Pa.

Charles E. Shepard, M.D., Professor of Hygiene and Director of Student Health, Stanford University, Calif.

Public Health Nursing Section

Henrietta M. Adams, R.N., M.S., Associate Professor and Director of Nursing Education, School of Nursing, University of Washington, Seattle, Wash.

Kathleen M. Logan, R.N., Supervisor of Nurses, Rutherford County Health Department, Murfreesboro, Tenn.

Helen C. Manzer, R.N., Ph.D., Associate Professor of Education and Director of Curricula in Nursing Education, School of Education, New York University, New York, N. Y.

Frances C. Montgomery, R.N., M.A., Pro-

fessor of Public Health Nursing, College of William and Mary, Richmond, Va.

Dorothy Rood, Ph.D., Associate Professor and Director of Public Health Nursing, Loyola University, Chicago, Ill.

Beatrice Short, R.N., B.S., Superintendent, Indianapolis Public Health Nursing Association, Indianapolis, Ind.

Edith L. Soule, R.N., Director, Division of Public Health Nursing, State Bureau of Health, Augusta, Me.

Helen V. Stevens, R.N., B.S., Director, Public Health Nursing Association of Pittsburgh, Pittsburgh, Pa.

Unaffiliated

Fred L. Moore, M.D., C.P.H., Associate Professor of Preventive Medicine and Community Health, Long Island College of Medicine, Brooklyn, N. Y.

James L. Neff, Executive Secretary, Nassau County Medical Society, Mineola, L. I., N. Y.

George St. J. Perrott, M.A., Statistician, U. S. Public Health Service, Washington, D. C.

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

Samuel R. Berenberg, M.D., Medical Center, Greenbelt, Md., Director, Dept. of Public Health

Bryson E. Cox, M.D., 226 North 5th St., Coalinga, Calif., Health Officer and School Physician

W. W. Crook, M.D., Stone Bath House, Glenwood Springs, Colo., Garfield County Health Officer

Isbin S. Giddens, M.D., Millen, Ga., Commissioner of Health, Jenkins County Health Dept.

Harold W. Hackler, M.D., Poplar, Mont., Senior Physician, U. S. Indian service

Charles C. Hedges, M.D., Health Dept., Savannah, Ga., City-County Health Officer

James M. Hershey, M.D., D.P.H., Pouce Coupe, B. C., Canada, Director, Peace River Health Unit

John M. Hooper, M.D., Public Health District #1, Floydada, Tex., Director

Wilbur T. Little, M.D., 903 Macon Ave., Canon City, Colo., Fremont County Health Officer

John L. Reiger, M.D., Box 121, Craig, Colo., City-County Health Officer

Earl A. Rogers, M.D., Madison, Nebr., Medical Director, District Health Unit #2

Wyatt E. Royce, M.D., Box 747, Covington, Va., Health Officer

Wixom S. Sibley, M.D., U.S.P.H.S., 14th Ave. & Lake St., San Francisco, Calif., Assistant Surgeon

William O. Whitaker, M.D., Box 1, Creede, Colo., City-County Health Officer

O. F. Whitman, M.D., Box 193, Statesboro, Ga., Commissioner of Health, Bullock County Health Dept.

Laboratory Section

M. Elmer Christensen, B.S., 35 State Capitol, Salt Lake City, Utah, State Chemist

Bernice U. Eddie, M.A., Hooper Foundation for Medical Research, Medical Center, San Francisco, Calif., Instructor in Research Medicine

C. Virginia Fisher, Ph.D., Warner Institute, 113 W. 18 St., New York, N. Y., Bacteriologist

Donald M. Hetler, Ph.D., Montana State University, Missoula, Mont., Professor of Bacteriology & Public Health

Ruby S. Hirose, Ph.D., Wm. S. Merrell Co., Lockland Station, Cincinnati, Ohio, Biologist

Lois E. Hoar, B.S., Montana State Tuberculosis Sanitarium, Rt. 1, Deer Lodge, Mont., Laboratory Technician

Evelyn L. Kuehn, 303 N. Ewing St., Helena, Mont., Laboratory Technician, St. Peter's Hospital

Elizabeth Maltaner, B.S., 388 New Scotland Ave., Albany, N. Y., Associate Bacteriologist, Division of Laboratories and Research, New York State Dept. of Health

Mrs. Frances Martin, 318 Hickory St., Anacondo, Mont., Medical Technologist

Granville M. Neal, B.S., 23 Marden St., Cranston, R. I.

Arthur W. O'Donnell, B.S., 837-9 Ave., Helena, Mont., Serologist, State Board of Health

Edith M. Rich, M.S., Biology Dept., Trinity College, Washington, D. C., Teacher of Bacteriology

Walter A. Tschirgi, B.S., 516 W. Clev St., Bozeman, Mont., Research Assistant, Department of Bacteriology, Montana State College

Albert L. Vadheim, Jr., B.A., State Board of Health, Helena, Mont., Technician, Hygienic Laboratory

Julia Vinograd, M.D., 18-45 21 Road, Astoria, L. I., N. Y., Bacteriologist, Bureau of Laboratories, New York City Dept. of Health

Donald E. Warner, B.S., Box 339, Helena, Mont., Sanitary Inspector, State Board of Health

Vital Statistics Section

Lewis Conrad, B.S., State Board of Health, Helena, Mont., Fiscal Agent

Public Health Engineering Section

William H. Edwards, Jr., C.E., 1406 Mozley Place, S.W., Atlanta, Ga., Sanitary Engineer, Dept. of Health

Leonard H. Ledford, Sandersville, Ga., Sanitarian, Washington County Health Dept.

Industrial Hygiene Section

David Schlein, M.D., 416 N. Wood Ave., Linden, N. J., Toxoid Administrator, Dept. of Health

Child Hygiene Section

Stuart W. Adler, M.D., 221 West Central, Albuquerque, N. M., Pediatrician

Abraham H. Kantrow, M.D., 12-26 31 Ave., Astoria, L. I., N. Y., Assistant Director, School Health Study

C. Heyden Phillips, M.D., 200 S. Franklin St., Wilkes Barre, Pa., Director, Maternal and Child Health, District #1

Public Health Education Section

Mrs. Elizabeth Atwood, Browning, Mont., Field Nurse, U. S. Indian Service

Arthur E. Bagley, 44 Gramercy Park, New York, N. Y., Director, Metropolitan Life Exhibit, New York World's Fair

Rudolf C. Bertheau, A.B., 50 West 50 St., New York, N. Y., Secretary, American Eugenics Society

Ruth N. Crawford, B.S., C.P.H., 719 Hamilton St., Allentown, Pa., Executive Secretary, Lehigh County Tuberculosis Society

Clarence W. Davis, M.A., 606 Gresham Place, N.W., Washington, D. C., Teacher of Health Education, Howard University

Esther S. Horine, A.B., 2 N. Beechwood Ave., Catonsville, Md., Editorial Assistant, Public Health Education, Baltimore Health Department

Alma L. Jakoubek, R.N., 120 4 Ave., Apt. 7, Havre, Mont., School Nurse, Board of Education

Guido Ruiz-Moreno, M.D., Cerrito 1517, Buenos Aires, Argentine, S. A., Professor of Physiology, Girls High School

Jack Saylin, A.B., 508½ Forest Ave., Los Angeles, Calif., Medical Social Worker, Health Dept.

Fred L. Shoenberger, 5 E. Long St., Columbus, Ohio, Secretary, Ohio Dairy Products Association

Public Health Nursing Section

Henrietta Crockett, Box 65, Helena, Mont., Secretary, Montana Tuberculosis Association

Evelyn W. Gilcrest, B.S., C.P.H., 1010 Cragmont, Berkeley, Calif., Director of Nursing Service, Health Dept.

Jean Hand, R.N., 29 Cedar Ave., Towson, Md., Public Health Nurse, Baltimore County Health Dept.

Aagot Hoyendahl, R.N., Box 242, Hamilton, Mont., County Nurse

Wilhelmina C. Ihrig, Johnson, Nebr., Nurse
E. Doris Johnson, R.N., 1001 Atwater Ave., Bloomington, Ind., Supervisory Nurse, State Board of Health

Bertha E. Jutras, R.N., 109 Woodbine St., Cranston, R. I., Consultant in Public Health Nursing, State Dept. of Health

Aagot Lian, Ekalaka, Mont., County Nurse
Irene McQuiston, R.N., Greenfield, Mo., Public Health Nurse

Mary M. Morris, R.N., Mount Vernon, Mo., Public Health Nurse

Henrietta M. Schoenbeck, R.N., 809 Lake Blvd., St. Joseph, Mich., School Nurse, Board of Education

Montrose L. Williams, 1884-7 Ave., Apt. 64, New York, N. Y., Staff Nurse, Community Service Society

Epidemiology Section

Granville W. Larimore, M.D., 2129 N. Dayton St., Chicago, Ill., Assistant Medical Superintendent, Hospital Section, Board of Health
George W. Setzer, M.D., Malta, Mont., City-County Health Officer

Unaffiliated

George B. Davis, M.D., 29 Whitfield St., Guilford, Conn., Graduate Student, Dept. of Public Health, Yale Medical School
Charles T. Snyder, M.D., 1100 Park Ave., New York, N. Y.

DECEASED MEMBERS

Miss Grace Abbott, Chicago, Ill., Elected Member 1929
Roy R. Jones, M.D., Washington, D. C., Elected Member 1935

Harry A. Simrell, M.D., Stockton, Mo., Elected Member 1938

CLOSING DATE FOR ACCEPTING FELLOWSHIP APPLICATIONS

NOTICE is hereby given to any interested members that September 1 is the closing date for accepting Fellowship applications for 1939 election.

Eligible members wishing to apply for Fellowship this year should submit their completed applications as much in advance of this date as possible.

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge.

Replies to these advertisements, when keyed, should be addressed to the American Public Health Association, 50 West 50th Street, New York, N. Y., identifying clearly the key number on the envelope.

POSITION AVAILABLE

The Board of Health of Tulsa, Oklahoma, will receive applications from trained and experienced physicians for the full-time position of Superintendent of Health. (See page 975.) Qualified applicants should communicate with Dr. Ned R. Smith, Oakwood Sanitarium, Rural Route 6, Tulsa.

POSITIONS WANTED

Physician, experienced in health administration of cities and states, will consider attractive opening in maternal and child health or health education. A343

Physician; M.D., University of Cincinnati; with postgraduate training in venereal disease control, Johns Hopkins; is available as venereal disease control officer. A363

Physician; M.D., Syracuse University; postgraduate studies in bacteriology and immunology; will consider position as health officer or epidemiologist. Has served as director of county health unit, director of industrial hygiene and medical statistics and venereal disease field survey officer. A305

Well qualified physician; M.D., Rush; M.S.P.H., University of Michigan; with three years' residence in tuberculosis, and special interest in venereal disease control; seeks responsible appointment. Excellent references. A406

Experienced physician, administrator, epidemiologist and teacher, now employed, with C.P.H. from Johns Hopkins, and 14 years' public health background, will consider position. Prefers epidemiology in city or state department. Excellent references. A355

Physician; M.D., Vanderbilt University; Dr.P.H., Johns Hopkins; experienced as epidemiologist, health officer and professor of preventive medicine; seeks position as administrator or epidemiologist. A397

Physician, aged 30; M.D., University of Illinois; C.P.H., University of California; experienced as instructor in medicine and director of state division of epidemiology; desires position in communicable disease control or administration. A399

HEALTH EDUCATION

Health educator, with excellent background of teaching experience in schools; M.S.P.H., University of Michigan; wishes a position where skill with educational sound film projection and other recognized technics will be appreciated. H405

Young woman, with C.P.H. from Massachusetts Institute of Technology and broad experience in the health education field, consisting of consulting service to schools, in-service training of teachers, and health education coordination, desires position as health education coordinator or as a teacher of health education. H428

LABORATORY

Broadly experienced laboratory director with excellent background, now employed southern state, seeks responsible position in laboratory work or teaching of bacteriology, immunology and pathology. L426

Bacteriologist, aged 30, Ph.D., 1938; special experience and research in anaerobic bacteriology; experienced in hospital and out-patient laboratory work and in teaching; seeks position in commercial or public health laboratory. L424

Woman bacteriologist; B.A., Chemistry, 1933; 5 years' experience in experimental and practical therapeutics including animal work; desires position in public health field. L394

Bacteriologist and serologist, recently graduated from the University of Michigan with M.S.P.H., seeks position with promise. Willing to start modestly. L425

Bacteriologist, aged 33, with training in serology; for the past 4 years bacteriologist in charge, public health laboratory; will consider opening. L427

MISCELLANEOUS

Young woman physician, M.D., M.S., D.Sc., desires position in public health work or medical research, particularly in the field of pediatrics or child hygiene. Now resident in pediatrics. Several years research experience in parasitology and medical zoology. C429

Situations Open

ASSOCIATE PROFESSOR PUBLIC HEALTH—Physician in thirties with special training and experience in preventive medicine preferred; good research record advantageous; \$3,000-\$4,000; university medical school. 80-PH, Medical Bureau, Pittsfield Building, Chicago.

PUBLIC HEALTH PHYSICIAN—Eastern physician, experienced public health or administration; work entirely administrative; \$4,000. 81-PH, Medical Bureau, Pittsfield Building, Chicago.

SCHOOL PHYSICIAN—Recent graduate contemplating public school health service as life work; duties include some teaching and dispensary service for students; eastern university; \$200. 82-PH, Medical Bureau, Pittsfield Building, Chicago.

PUBLIC HEALTH PHYSICIAN—Southern college; enrollment averages a thousand, including faculty. 83-PH, Medical Bureau, Pittsfield Building, Chicago.

SCHOOL PHYSICIAN—Must be familiar with public health problems, eligible Washington licensure; excellent connection. 84-PH, Medical Bureau, Pittsfield Building, Chicago.

SCHOOL NURSE—Graduate nurse, preferably of mature years, for appointment in school enrolling principally boys of junior-senior high school grade from rural districts; duties light; must be Protestant. 85-PH, Medical Bureau, Pittsfield Building, Chicago.

SCHOOL NURSE—Exclusive school for girls, with average enrollment of 100; duties will include complete charge infirmary, some teaching and chaperoning; graduate nurse, 30-35, preferably Protestant, desired; location near eastern cultural center. 86-PH, Medical Bureau, Pittsfield Building, Chicago.

PUBLIC HEALTH NURSE—For combination appointment including care of children in small day nursery and visiting insurance policy holders in restricted area; hours 8-5; \$125, private office, car and car maintenance; must be certified. 87-PH, Medical Bureau, Pittsfield Building, Chicago.

SCIENCE INSTRUCTOR—Qualified to teach public health in school of nursing; 600-bed hospital; midwestern metropolis. 88-PH, Medical Bureau, Pittsfield Building, Chicago.

Situations Wanted

PUBLIC HEALTH NURSE—Particularly interested in executive position in clinic or public health field; graduate of teaching hospital; B.S. in public health nursing; graduate courses in public health at Western Reserve and Columbia; several years' executive experience in public health nursing; four years, director of large clinic; for further information, please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

HEALTH EDUCATOR—Graduate nurse and B.S. degrees; social service certificate; three years' experience in social service; four years, industrial nursing; ten years, director of a health council; for further details, please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

BACTERIOLOGIST—B.A., eastern school; C.P.H. and Ph.D. (bacteriology), Yale University; has done considerable research; four years, bacteriologist and research technician, public health laboratories; desires appointment in public health laboratories; for further details, please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

PUBLIC HEALTH PHYSICIAN—Desires connection; M.D., Virginia; several years' successful private practice; ten years' public health work during which time he has been promoted continuously; excellent reason for relocating; for further details, please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

NEWS FROM THE FIELD

ADVISORY COUNCIL ON MEDICAL EDUCATION

AN Advisory Council on Medical Education came into being on June 24 in Chicago, when 11 national organizations concerned with the training of physicians to meet the present day needs of medical care for the country recognized the necessity for some central representative agency to make medical training more effective. Willard C. Rappleye, M.D., Dean of the Faculty of Medicine at Columbia University College of Physicians and Surgeons, was elected President. Dr. Rappleye pointed out that this organization for the first time brings together various national bodies dealing with all phases of the training and licensing of physicians, beginning with the preparatory college work and including medical education, hospital internship, residency, licensure, and graduate training for specialization.

The American Public Health Association is represented on the Advisory Council on Medical Education through W. S. Leathers, M.D., Dean and Professor of Preventive Medicine and Public Health, School of Medicine, Vanderbilt University, Nashville, Tenn., and Chairman of the Committee on Professional Education of the American Public Health Association. Other organizations represented are the Association of American Medical Colleges, the American Hospital Association, the Catholic Hospital Association, the American Protestant Hospital Association, the Association of American Colleges, the Federation of State Medical Boards of the United States of America, the Advisory Board for Medical Specialties, the National Board of Medical Examiners, the American College of Physicians, the American College of Surgeons, the Association of American

Universities, and the American Association for the Advancement of Science, Division of Medical Sciences.

Among the problems considered by the Council at its meeting were those of educational standards for the hospital internship, adequate training for the specialist, sound programs for the continued education of physicians in practice, modifications in college preparation for medical studies, the simplification of the procedure for licensure in the 48 separate states and the status of training of graduates of foreign medical schools.

DEDICATION OF AMERICAN MUSEUM OF HEALTH, INC.

ON Saturday, June 17, 1939, many physicians, public health officials, medical scientists, educators, and other prominent persons participated in ceremonies dedicating the American Museum of Health, Inc. The exercises were held in the Hall of Man of the Medicine and Public Health Building at the New York World's Fair.

With generous support from the Carnegie Corporation of New York, the Rockefeller Foundation, the Oberlaender Trust, and the major life insurance companies, this Museum has created or acquired most of the exhibits in the Medicine and Public Health Building. At the end of the Fair period, it will add to and maintain these displays in a permanent health teaching center in the City of New York. Coöperation in securing a building to house its activities has been assured by several public officials, including Mayor Fiorello H. LaGuardia, a director of the Museum.

Among the speakers at the dedication ceremonies were: Abel Wolman, Dr. Eng., Edward S. Godfrey, M.D., Louis I. Dublin, Ph.D., Homer N.

Calver, John L. Rice, M.D., Mayor LaGuardia, Frederick Osborn, Livingston Farrand, M.D., and George Baehr, M.D.

DR. ROBERT H. RILEY HONORED FOR
TWENTY-FIVE YEARS OF SERVICE

ON July 5th the employees of the Maryland State Department of Health gave a testimonial banquet to Dr. Robert H. Riley, in honor of the 25 years since he joined the Department. The *Baltimore Sun* editorially points out that under Dr. Riley's leadership Maryland became the first of the 48 States to place its entire rural population under the protection of full-time local health officers. Credit is also given to Dr. Riley for the development of a statewide network of branch public health laboratories.

TULSA SEEKS COMPETENT SUPERIN-
TENDENT OF HEALTH

THE City of Tulsa, Okla., population 141,000 plus 35,000 in surrounding metropolitan areas, has recently recast its public health program through an ordinance which provides for a non-partisan health board to have jurisdiction over all public health work. It is expected that this set-up eventually will become a coöperative program between the city and county, and the health work in the public schools may also be included.

The new program is based on a public health survey recently completed under the auspices of certain of the city officials. The program is said to have the full approval and complete coöperation of the Tulsa County Medical Society which shared in promoting its consideration. It is announced that the immediate problem of the Board of Health is to secure a competently trained, experienced full-time superintendent of health and that the Board will receive applications from qualified persons for this position.

DR. STAMPAR AT UNIVERSITY OF
CALIFORNIA

DR. Andriya Stampar, Professor of Social Medicine, State University, Zagreb, Yugoslavia, has been named to the newly created post of Rosenberg Professor in the Public Social Sciences at the University of California, Berkeley. Dr. Stampar will be the first to hold the position, which was created by a gift from the Rosenberg Foundation of San Francisco. A graduate of the University of Vienna, Dr. Stampar formerly served as Director of Health of Yugoslavia. He was adviser on health matters to the National Government of the Chinese Republic from 1933 to 1936, when he became expert on health matters to the health section of the League of Nations. He was a visiting lecturer under the Rockefeller Foundation in the United States in 1938.

While on the Berkeley campus he will give two courses, one for graduate students and one for upper division students. He will also deliver a series of public lectures on the campus, and, by special conditions of the Foundation grant, will be enabled to visit other parts of the state for lectures and consultations, according to the *Journal of the American Medical Association* of July 1, 1939.

MARYLAND LAW REGARDING HEALTH
COMMISSIONERS

EFFECTIVE June 1, 1939, a new law in Maryland provides for the appointment of the Director of the State Department of Health by the State Board of Health rather than by the Governor as in previous years.

The new law makes the Commissioner of Health of the City of Baltimore ex-officio one of the nine members of the State Board of Health, and Dr. Robert H. Riley is designated as the Director of Health, to continue in this capacity indefinitely, subject

only to competent performance. It is provided that the Director of Health must be an experienced physician, skilled in public health and hygiene, and he may be removed by the Board of Health only for incompetency or misconduct in the same manner as civil officers receiving appointment from the Executive for a term of years.

CANADIAN PUBLIC HEALTH ASSOCIATION

OFFICERS of the Canadian Public Health Association have been elected for 1940 as follows:

Honorary President: The Hon. J. M. Uhrich, M.D., Regina (Minister of Health, Province of Saskatchewan)

President: Dr. R. O. Davison, Regina (Deputy Minister of Public Health, Saskatchewan)

Vice-Presidents: Dr. Grant Fleming, Montreal (Dean, Faculty of Medicine, McGill University); Dr. Jean Gregoire, Quebec (Deputy Minister, Ministry of Health of Quebec); Dr. J. J. McCann, Renfrew, Ontario (Medical Officer of Health, Renfrew); Miss Elizabeth L. Smellie, C.B.E., Ottawa (Chief Superintendent, Victorian Order of Nurses for Canada)

Honorary Secretary, Dr. J. T. Phair, Toronto (Chief Medical Officer of Health, Province of Ontario)

Associate Secretary, Dr. A. H. Sellers, Toronto (Medical Statistician, Department of Health of Ontario)

Honorary Treasurer, Dr. A. L. McKay, Toronto (Department of Health of Ontario)

Chairman of the Editorial Board, Dr. R. D. Defries, Toronto (Associate Director, School of Hygiene and Connaught Laboratories, University of Toronto)

BLOOD STUDY INSTITUTE

THE University of Wisconsin Medical School, Madison, has announced an Institute for the Consideration of the Blood and Blood-forming Organs, September 4-6. In addition to the consideration of many aspects of anemia, a section will be devoted to consideration of the anemias of nutritional deficiency, under the direction of Dr. George R. Minot, of the Harvard Medical School and the Thorndike Memorial Laboratory, Boston.

NEW YORK CITY INDICTMENT DROPPED AGAINST COMMISSIONERS OF HEALTH AND SANITATION

ON April 4 a Grand Jury of the Borough of Queens returned indictments against several individuals and companies including John L. Rice, M.D., Commissioner of Health, and William F. Carey, Commissioner of Sanitation, charging that land fill dumps of waste and garbage at various points were a nuisance and that they endangered public health and safety. A change of venue to Bronx County was granted on May 16, and on June 19 the New York State Supreme Court dismissed the indictments under an agreement to let an impartial commission arbitrate the matter. Under the terms of this agreement, Dr. Thomas Parran will appoint a board of five, consisting of four physicians outstanding in health work and an experienced sanitary engineer, to make an investigation and examination of the land fills maintained by the Department of Sanitation.

This board was asked by the Court not only to decide whether the land fills were a menace to public health and safety but to suggest possible improvements, even if they were not found to be a menace. Subsequently, Dr. Thomas Parran, according to the press, announced the appointment of the following: Eugene L. Bishop, M.D., C.P.H., Milton J. Rosenau, M.D., Huntington Williams, M.D., Dr.P.H., Kenneth F. Maxcy, M.D., Dr.P.H., and Ralph E. Tarbett, C.E.

JOHNS HOPKINS UNIVERSITY DEPARTMENT OF PREVENTIVE MEDICINE

THE Dean of the Johns Hopkins Medical School, Baltimore, has announced that the Rockefeller Foundation has appropriated funds covering a ten year plan to establish a department of preventive medicine in the amount of \$350,000.

INTERNATIONAL CONGRESS FOR MICROBIOLOGY

THE Third International Congress for Microbiology will be held in New York at the Waldorf-Astoria Hotel, September 2-9, 1939. More than six hundred papers on a variety of subjects will be presented, including papers on bacterial variation and taxonomy, microbiological chemistry and physiology, viruses and viral diseases, rickettsias and rickettsial diseases, fungi and fungous diseases (including bacterial diseases of plants), protozoölogy and parasitology, medical and veterinary bacteriology (including chemo- and sero-therapy), industrial and agricultural microbiology, and immunology.

Anyone interested in these subjects may attend the meetings. A registration fee of \$5.00 will be charged. Those wishing to attend would do well to communicate with the treasurer, Dr. Kenneth Goodner, Rockefeller Institute, York Avenue and 66th Street, New York, N. Y.

PUBLIC HEALTH WEEK OBSERVATION IN NEW JERSEY

THE Bergen County [N. J.] Medical Society sponsored a Public Health Week, beginning May 14, in coöperation with public health groups. Exhibits were shown at various hospitals.

A meeting was held under the auspices of the woman's auxiliary to the county society in Hackensack on May 19, with Haven Emerson, M.D., of New York, as the speaker on "Organized Care of the Sick and Public Health in Relation to 'Socialized Medicine.'" The motion picture "The Birth of a Baby" was shown in Hackensack on May 20 to invited groups. The week was concluded, on May 21, with the dedication of an "orthopedic pool" at the Bergen County Hospital, presented by the American Legion.

NEW HEALTH OFFICER IN MICHIGAN

THE appointment of A. J. Moyer, M.D., of Charlotte, Mich., as State Health Officer, succeeding Don W. Gudakunst, M.D., Dr.P.H., effective August 1, has been announced by the Governor.

ARIZONA PUBLIC HEALTH ASSOCIATION OFFICIALS

AT its recent Annual Meeting the Arizona Public Health Association elected the following officers for 1939-1940:

President—W. W. Peter, M.D., Window Rock

President-elect—H. D. Ketcherside, M.D., Phoenix

1st Vice-President—O. W. Fowler, Phoenix

2nd Vice-President—Fred J. Baker, Flagstaff

Secretary-Treasurer—Marion E. Stroud, Phoenix

GEORGIA PUBLIC HEALTH ASSOCIATION OFFICIALS

AT its recent Annual Meeting, the Georgia Public Health Association elected the following officers for the year 1939:

President—William H. Weir, Atlanta

Vice-President—Elizabeth Fulcher, Marietta

Secretary-Treasurer—Gordon T. Crozier, M.D., Valdosta

MICHIGAN STATE COUNCIL OF HEALTH

NEW members of the Michigan State Council of Health, recently appointed by Governor Dickinson and confirmed by the Senate for terms of six years, include:

President: Henry F. Vaughan, Dr.P.H., Detroit

Secretary: John Lavan, M.D., Grand Rapids

A. D. Aldrich, M.D., Houghton

Carleton Dean, M.D., Charlevoix

Roy C. Perkins, M.D., Bay City

This Council serves in an advisory capacity to the State Health Commissioner.

OHIO FEDERATION OF PUBLIC HEALTH OFFICIALS

THE Ohio Federation of Public Health Officials held its Annual Convention in Columbus on May 19, 1939, at which time the following officers were elected for 1939:

President—Dr. H. H. Pansing, Dayton, O.
Vice-President—Dr. E. H. Schoenling, Cincinnati, O.

Secretary-Treasurer—Dr. W. D. Bishop, Greenville, O.

Delegate to A.P.H.A.—Dr. G. D. Lummis, Middletown, O.

Alternate—Leo F. Ey, Columbus, O.

PERSONALS

Central States

GEORGE E. ADAMS, Deputy Registrar of Vital Statistics for the City of Milwaukee, Wis., for 29 years, and a Health Department employee for 53 years, has retired.

DR. JOHN K. ATLAND, of Allegan, Mich., has been appointed Director of the newly created health unit in Traverse County.

GREGOIRE F. AMYOT, M.D., D.P.H.,* who has been Administrative Associate of State Health Studies conducted by the Committee on Administrative Practice of the American Public Health Association, has accepted an appointment during the fall and winter quarters of the coming academic year in the Department of Preventive Medicine and Public Health at the University of Minnesota, Minneapolis. Dr. Amyot will have charge of the formal instruction in public health administration.

ALBERT C. BAXTER, M.D.,† Acting Director of the Illinois State Department of Health since 1937, has been appointed head of the Department.

DR. WILLARD G. BEATTIE, of Farmington, Mich., resigned as City Health Officer, effective May 15, to devote his time to private practice.

PHILIP E. M. BOURLAND, M.D., M.S.P.H.,† of Iron Mountain, Mich., has resigned as Director of the Dickinson County health unit.

RUTH E. BOYNTON, M.D.,† Associate Professor of Preventive Medicine and Public Health, University of Minnesota Medical School, Minneapolis, Minn., has been appointed to the State Board of Health.

HERMAN N. BUNDESEN, M.D.,* who has been on a leave of absence since November, 1938, has returned to his activities as Health Commissioner and President of the Board of Health of Chicago.

GEORGE A. DUNDON, B.J.,* Director of Statistics and Health Education, of the Department of Health, has been appointed Deputy Registrar of Vital Statistics for the City of Milwaukee, Wis., succeeding GEORGE E. ADAMS, retired.

BURT A. DYAR, M.D., of Pierre, S. D., has been appointed full-time secretary of the State Interallied Professional Council, which represents the medical, dental, nursing, hospital, and pharmaceutical associations.

DR. DARREL L. EVANS, of Manhattan, Kans., recently resigned as Health Officer of Riley County.

DR. EDWIN H. FEDERMAN, of Montello, Wis., has been appointed Health Officer of Eau Claire County.

DR. PERCY A. PETITT, of Paola, Kans., has been appointed Health Officer of Miami County.

EDWIN H. PLACE, M.D.,† of Midland, Mich., who has been attending the University of Michigan School of Public Health on a leave of absence, has resigned as Health Officer of Midland County. Dr. Place has accepted a fellowship for study in

* Fellow A.P.H.A.

† Member A.P.H.A.

public health with the Kellogg Foundation of Battle Creek.

HARVEY J. SKARSHAUG, M.D.,† of Fargo, N. D., has resigned as City Health Officer.

DR. ALFRED R. SORENSON, of Minot, N. D., has been appointed City Health Officer, succeeding DR. JOHN L. DEVINE.

Eastern States

ALFRED J. ASGIS, D.D.S.,† of New York, N. Y., had the degree of Ph.D. conferred upon him at the June commencement at New York University.

MERLE R. FRENCH, M.D.,* who has been for several years Commissioner of Health for Cortland County Department of Health, Cortland, N. Y., has resigned, effective September 1, to become Health Director of Van Buren County, Paw Paw, Mich.—one of the counties participating with the W. K. Kellogg Foundation in a special health program.

PROFESSOR IRA V. HISCOCK,* of the Department of Public Health, Yale University, New Haven, Conn., was awarded an honorary Doctor of Science degree at the June commencement of Wesleyan University, Middletown, Conn.

DR. ALFRED NEWTON RICHARDS, Professor of Pharmacology at the University of Pennsylvania, Philadelphia, Pa., has been elected Vice-President of the University in charge of medical affairs and in this capacity will have supervision of the teaching in public health to graduate and undergraduate students newly organized under A. Parker Hitchens, M.D.,* Pepper Professor of Preventive Medicine and Public Health.

HANS ZINSSER, M.D.,* was awarded the honorary degree of Doctor of Science by both Yale University and

Harvard University at the June Commencement exercises.

Southern States

DR. LEE SCOTT BARKSDALE, of Richmond, Va., has been appointed Health Officer of Hopewell.

DR. CHARLES E. CATCHINGS, of Woodville, Miss., was recently named Health Officer of Wilkinson County, to fill the unexpired term of DR. EDWIN M. BUTLER, of Centerville, who has been appointed Health Officer of Union County.

DR. JOHN W. DORMAN, of Holly Springs, Miss., was recently placed in charge of the Marshall County Health Department, succeeding GUY R. POST, M.D.,† who went to Clarksdale.

DR. JOHN W. FRANCIS, of Perry, Okla., has been appointed Health Superintendent of Noble County.

GEORGE L. HALL,† of Baltimore, Md., Acting Chief Engineer of the Bureau of Sanitary Engineering for some years, has been appointed Chief Engineer of the Maryland State Department of Health, succeeding ABEL WOLMAN, DR.ENG.,* resigned.

DR. RAYBURN N. JOYNER, of Marianna, Fla., has resigned as Director of the Jackson County Health Department, to enter private practice.

DR. JAMES A. SPROLES, JR., formerly of Jackson, Miss., has been appointed Health Officer of Amite County.

ABEL WOLMAN, DR.ENG.,* Professor of Sanitary Engineering, Johns Hopkins University, Baltimore, retired as Chief Engineer of the Maryland State Department of Health, effective July 1. On that date he became Consulting Engineer to the State Board of Health and to the State Department of Health.

WILLARD H. WRIGHT, D.V.M., PH.D.,† has been appointed Chief of the

* Fellow A.P.H.A.

† Member A.P.H.A.

Division of Zoölogy in the National Institute of Health, U. S. Public Health Service, Washington, D. C., succeeding the late MAURICE C. HALL, PH.D., D.V.M.†

DEATHS

P. P. CAUSEY, M.D.,† of Courtland, Va., Health Officer of Southampton County, died on June 5.

HOYT E. DEARHOLT, M.D.,* Executive Secretary of the Wisconsin Anti-

Tuberculosis Association, Madison, Wis., died July 12.

ALFRED FRIEDLANDER, M.D.,† Dean of the College of Medicine, University of Cincinnati, Cincinnati, Ohio, died May 28.

WILLIAM F. LUNSFORD, M.D., M.P.H.,† for the last 3 years City Health Director of Kansas City, Kans., died July 4, in Nevada, Mo., from the results of an automobile crash. He was 41 years old.

CONFERENCES AND DATES

American Association for the Advancement of Science. Annual Meeting—Columbus, Ohio, December 27, 1939–January 2, 1940.

American Congress of Physical Therapy. Hotel Pennsylvania, New York, N. Y. September 5–8. (Following Seminar in Physical Therapy for Physicians and Technicians, August 30–September 2.)

American Congress on Obstetrics and Gynecology—sponsored by the American Committee on Maternal Welfare, Inc. Municipal Auditorium, Cleveland, Ohio. September 11–15.

American Dietetic Association—22nd Annual Meeting. Hotel Ambassador, Los Angeles, Calif. August 27–31.

American Public Health Association. 68th Annual Meeting. Hotel William Penn, Pittsburgh, Pa. October 17–20.

American School Health Association. Hotel William Penn, Pittsburgh, Pa. October 16–20.

American Society of Civil Engineers—Fall Meeting. New York, N. Y., September 4–9.

American Standards Association. New

York, N. Y. November 30–December 1–2.

American Statistical Association—Annual Meeting. Philadelphia, Pa. December 27–30.

Association of Dairy, Food and Drug Officials of the United States—43rd Annual Conference. Hartford, Conn. September 26–29.

Association of Women in Public Health. Century Club, Pittsburgh, Pa. October 16.

Biological Photographic Association—9th Annual Convention. Mellon Institute for Industrial Research, Pittsburgh, Pa. September 14–16.

California Sewage Works Association—12th Annual Fall Convention. Oakland, Calif. September 18–19.

Colorado Public Health Association. Colorado Springs, Colo. October 3–4.

Convention for the Revision of the Pharmacopoeia of the United States. Washington, D. C. May 14, 1940.

Directors of Local Health Services Conference. Hotel Roosevelt, Pittsburgh, Pa. October 16.

Florida Public Health Association. Jacksonville, Fla. December.

Health Education Institute—American

* Fellow A.P.H.A.
† Member A.P.H.A.

- Public Health Association, Annual Meeting. Hotel William Penn, Pittsburgh, Pa. October 15-17.
- Institute for the Consideration of the Blood and Blood-forming Organs. University of Wisconsin Medical School, Madison, Wis. September 4-6.
- International Association for Identification. Tulsa, Okla. September 11-14.
- International Association of Milk Sanitarians, Inc.—Annual Meeting. New Hotel Mayflower, Jacksonville, Fla. October 25-27.
- International Cancer Congress—Third. Haddon Hall Hotel, Atlantic City, N. J. September 11-16.
- International Congress of Microbiology—Third. Waldorf-Astoria Hotel New York, N. Y. September 2-9.
- International Heating and Ventilating Exposition—Sixth. Under auspices of the American Society of Heating and Ventilating Engineers, and coinciding with its 46th Annual Meeting. Lakeside Hall, Cleveland, Ohio. January 22-26, 1940.
- International Society of Medical Health Officers. Hotel William Penn, Pittsburgh, Pa. October 16.
- Michigan Public Health Association. Lansing, Mich. November 1-3.
- Mississippi Public Health Association. Jackson, Miss. December 6-8.
- Municipal Public Health Engineers Conference. Hotel William Penn, Pittsburgh, Pa. October 16.
- National Association for Nursery Education—Biennial Meeting. New York, N. Y. October 25-28.
- National Association of Sanitarians. Oakland, Calif. December.
- National Institute for Traffic Safety Training (Second). University of Michigan, Ann Arbor, Mich. August 14-26.
- National Organization for Public Health Nursing. Hotel William Penn. Pittsburgh, Pa. October 15-16.
- National Pest Control Association—7th Convention. Hotel Pennsylvania, New York, N. Y. October 23-25.
- National Recreation Congress—24th. Boston, Mass. October 9-13.
- National Safety Congress and Exposition—28th. Atlantic City, N. J. October 16-20.
- National Society for the Prevention of Blindness. Annual Conference. Hotel Astor, New York, N. Y. October 26-28.
- National Warm Air Heating and Air Conditioning Association. Cleveland, Ohio. January 22-26, 1940.
- New Jersey Health and Sanitary Association—65th Annual Meeting. Berkeley-Carteret Hotel, Asbury Park, N. J. November 24-25.
- Pacific Science Congress—Sixth. Under the auspices of the National Research Council. Oakland, Calif., July 24-August 12.
- Pan-Pacific Surgical Association—Third Congress. Honolulu, T.H. September 15-28.
- Pennsylvania Public Health Association—Meeting with American Public Health Association. Hotel William Penn, Pittsburgh, Pa. October 18.
- Southern California Public Health Association. Long Beach, Calif. January 24, 1940.
- State Laboratory Directors Conference. Hotel William Penn, Pittsburgh, Pa. October 16.
- State Sanitary Engineers Conference. Hotel William Penn, Pittsburgh, Pa. October 16-17.
- Texas Public Health Association. Galveston, Tex. October 2-4.
- Tri-State Food & Health Officials. Hotel William Penn, Pittsburgh, Pa. October 18.
- West Virginia Public Health Association. Hotel Fairmont, Fairmont, W. Va. November 6-8.

Canada

International Hospital Association. Toronto, Ont. September 19-23.
 American College of Hospital Administrators. Toronto, Ont. September 24-25.
 American Hospital Association. Toronto, Ont. September 25-29.

FOREIGN

Fifth National Medical Congress of Uruguay. Montevideo, Uruguay. Summer of 1939.
 Summer Course of Phthisiology. Under direction of Professor Eugenio Morelli. Carlo Forlanini Institute, Rome, Italy. July 15-October 15.
 International Malaria Course for 1939. Under direction of Professor Giuseppe Bastianelli. Ettore Marchiafava Institute of Malariology, Rome, Italy. July 24-September 20.
 World Federation of Education Associations, Eighth Biennial Congress.

SAN JOURNAL OF
 AMERICAN COLLEGE OF
 DENTAL SURGEONS

Rio de Janeiro, Brazil. August 6-11.
 International Congress of Public Health and Public Safety. Liege, Belgium. August 12-15.
 Third International Neurological Congress. Copenhagen, Denmark. August 21-25.
 International Congress on Public Cleansing. Vienna, Austria. August 24-28.
 Eighth Pan American Child Congress. San Jose, Costa Rica. August 28-September 4.
 International Conference on Sewage Works and Disposal. Glasgow, Scotland. September 12-18.
 Intergovernmental Conference of American Countries on Rural Hygiene. Mexico City, Mexico. End of 1939 (postponed from November 10, 1938).
 International Management Congress. Stockholm, Sweden. September 19-23, 1941.

Best Sellers in the Book Service for July

Standard Methods for the Examination of Dairy Products—American Public Health Association.....	\$2.50
Handbook of Health Education—Ruth E. Grout.....	2.00
Health, Hygiene and Hooey—W. W. Bauer.....	2.50
Modern Ways with Babies—Elizabeth Hurlock.....	2.50
Eat and Keep Fit—Jacob Buckstein.....	1.00
Answers to Awkward Questions of Childhood—T. F. Tucker and M. Pout.....	2.00
Safely Through Childbirth—A. J. Rongy.....	2.00
Healthful Living—H. S. Diehl.....	2.50
Baby Care—Mary E. Law.....	2.00
Taking Care of the Baby's Health—Elma Rood.....	5.00
Teachable Moments—J. B. Nash.....	1.50
Shadow on the Land: Syphilis—Thomas Parran. Educational Edition	1.00
Bergey's Manual of Determinative Bacteriology. 5th ed. David H. Bergey, Robert S. Breed, E. G. D. Murray and A. Parker Hitchens	10.00

Order from the Book Service

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New York, N. Y.

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Volume 29

September, 1939

Number 9

LIBRARY
BALTIMORE COLLEGE OF
DENTAL SURGERY

Developments in the New York State Tuberculosis Program*

ROBERT E. PLUNKETT, M.D.

*General Superintendent of Tuberculosis Hospitals, Division of
Tuberculosis, State Department of Health, Albany, N. Y.*

THE behavior and control of tuberculosis, whether in the individual suffering from the disease or as a community problem, depend upon the proper control and disposal of bacilli-laden sputum. Control the sputum and spread is prevented; neglect this measure and cases multiply.

Although the tubercle bacillus is the specific cause of tuberculosis, it must be recognized that other factors contribute to both the epidemiology and pathogenesis of the disease. These contributing factors may be grouped under two headings—the constitutional and the environmental. Of these, the environmental factors are legion and appear to play a more common part in disease development than the constitutional. Recognizing the variables which may influence the disease in certain racial, industrial, and social groups, it can be stated that contact with a sputum positive case, with its oppor-

tunity for infection and reinfection by frequent and massive doses of tubercle bacilli, appears to be the most important single factor.

Keeping in mind the significance of bacilli-laden sputum, the following procedures are essential in the administration of control measures: The reporting and registration of cases of tuberculosis, active and progressive case finding, the segregation and treatment of patients suffering from the disease, domiciliary supervision of families in which tuberculosis is or has been a problem, rehabilitation of cases, the follow-up of all cases and contacts, and financial assistance to needy families in a manner free from the stigma of pauperism. Equally important is the periodic appraisal and evaluation of procedures and services, both from the viewpoint of administrative economy and the more effective extension of our knowledge of the epidemiology and pathogenesis of the disease.

From its beginning in 1913 when the Tuberculosis Division of the New York State Department of Health was estab-

* Read before the Health Officers Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 26, 1938.

lished, the growth and development of the program for the control of tuberculosis has been constant and progressive. At that time, reporting of cases and provision of sufficient hospital beds were the two factors of major importance, and the promotion of these were the two major activities of the division.

Since 1917, counties having more than 35,000 population have been required by law to maintain a tuberculosis hospital. As a result, 31 counties and 2 cities constructed sanatoria, and at the present time the beds in these hospitals, plus the beds in the 4 state tuberculosis hospitals, provide a ratio of 2.4 public beds for every death from tuberculosis. Including all other beds available in public and private institutions this ratio is 3.8.

The importance of having a roster of all known living cases of tuberculosis is too obvious to require discussion. In order that better local control and supervision of that problem could be effected, each of 20 state health districts maintains its own district roster, properly indexed and filed, whereby the size of the problem can be gauged and individual supervision provided. All reports are forwarded to the central office.

Coincidental with these developments came the gradual change from specialized tuberculosis field nursing service to a generalized nursing program in which tuberculosis assumed its proper relationship. Supervision and guidance of this nursing service, which is on a local basis, are provided through supervising nurses of the district health offices, the consultation nurses of the state tuberculosis hospitals, and the assistant directors of the Public Health Nursing Division of the central office.

As these state-wide activities were being developed and enlarged, the division undertook another activity of

major importance—case finding. This led to the establishment of an itinerant diagnostic chest clinic service on a strictly consultation basis in coöperation with the practising physicians. This provided a service to the rural areas where it was lacking. It required some time at the beginning to gain the good will and coöperation of the private physician, but soon this service became very popular with both physicians and patients.

As a result of the recommendations of the Governor's Health Commission appointed in 1930, 3 new state tuberculosis hospitals were constructed to serve 3 groups of small counties, and a new 100 bed infirmary building is nearing completion at the State Hospital for Incipient Tuberculosis at Ray Brook. The Ray Brook Hospital, established in 1904, was for the admission of patients with incipient or minimal tuberculosis from the entire state, but this new addition at the hospital will also serve as a district hospital for that area the same as the 3 new hospitals. The 4 areas serve 31 counties.

With the establishment of these new hospitals, the field clinics hitherto conducted by the staff of the central office were discontinued, that function, intensified and extended, being taken over by the hospitals.

In translating the above into administrative practice in New York State, the responsibility for the program is placed in the Division of Tuberculosis. There are 57 counties in upstate New York with an estimated total population of 6,080,444. These counties vary in population from 3,929 to 813,786. The death rate from tuberculosis for upstate New York has dropped from 161.5 per 100,000 in 1900 to 44.7 in 1938. Reference is made to Exhibit A.

The purposes of the division may be considered as threefold: (1) direct service to the people examined and studied, their families, and communi-

DEATH RATES, PER 100,000 POPULATION, FROM TUBERCULOSIS (ALL FORMS)
NEW YORK STATE EXCLUSIVE OF NEW YORK CITY
1900 - 1937

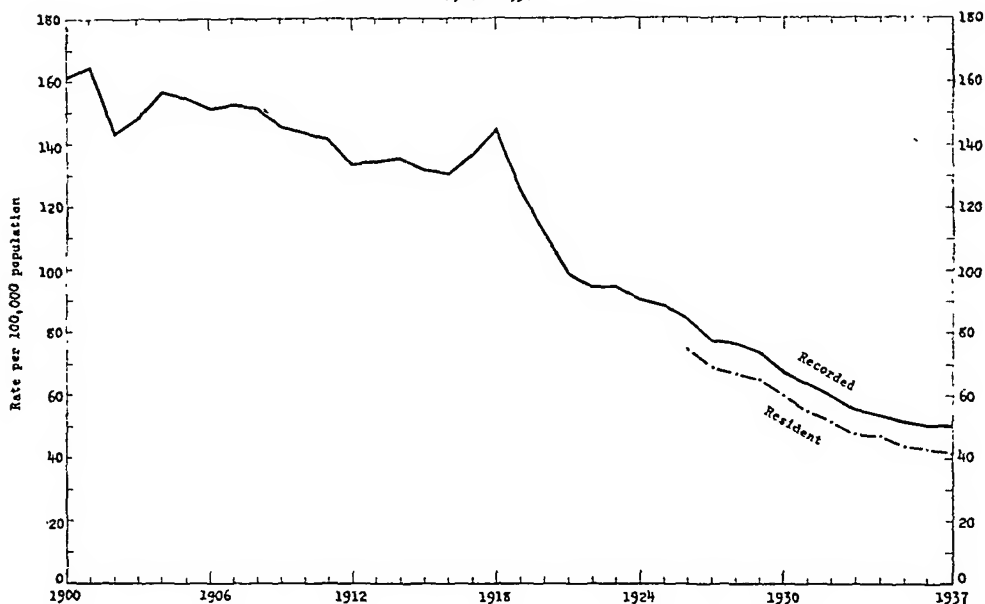


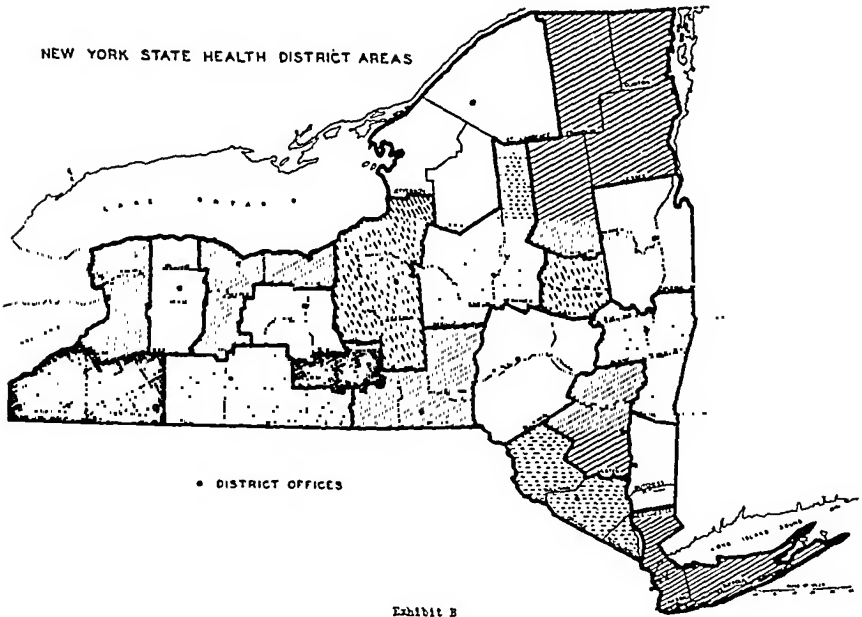
Exhibit A

ties; (2) research through the acquisition of data, its classification and interpretation; and (3) education of the public and the medical profession. Knowledge of the scope and extent of the disease problem in a community is as essential to the health officer as the extent and character of a lesion in an individual patient is to a clinician. Such knowledge may be acquired from detailed morbidity and mortality data.

By complete checking of detailed information on death certificates regarding residence, etc., and prompt and complete reporting of existing cases, the health officer is able actually to take stock and be guided wisely in his administrative program. To provide such opportunities, the reporting of tuberculosis cases is constantly being promoted by both the district offices and the division staff. Consequently, the tuberculosis report cards are routed, except for our largest cities and county health district areas, through the office of the district state health officer. Each district officer maintains a case register

for all reported cases residing in his district. The name, address, sex, age, clinical stage, and sputum status are all catalogued by the use of colored flags in a visible index file for ready reference in follow-up, public health nursing supervision, and all forms of community assistance toward control. Current data relating to the patient are secured from clinics, tuberculosis hospitals, and private physicians, from which each district officer is able to make periodic appraisals of the tuberculosis problem either in his entire district or in any of the counties within the district.

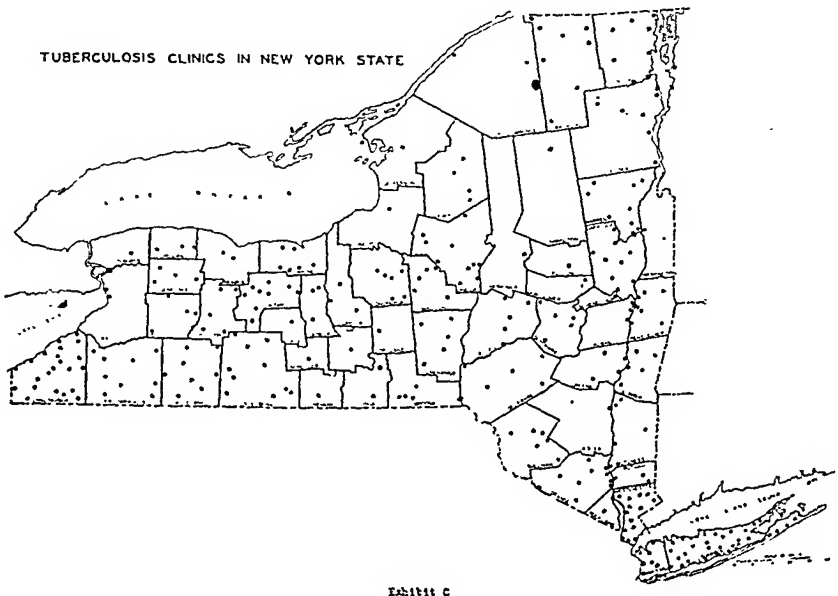
Time does not permit a detailed review of the many other advantages of having this information readily and constantly available. Obviously, the district officer is thereby enabled to direct more intelligently the field activities in tuberculosis control, to use the data in promoting advances in case-finding methods, to secure additional clinic sessions, and to employ the necessary number of public health nurses. Such data are most essential in direct-



ing the local public health nursing service along the most productive channels. Exhibit B shows the state health district areas.

The case finding activities in upstate New York are closely integrated in practically all localities with the 31 local tuberculosis hospitals and sanatoria. All the county tuberculosis hospitals

conduct a case finding service as an activity of their out-patient departments. Except in one or two counties in which the total area of the county is very small, each of the hospitals conducts itinerant clinics in various sections of the respective counties. Emphasis is placed upon the examination of contacts and patients who may be



referred by their family physicians because of symptoms referable to the chest. There are altogether approximately 120 semi-permanent or permanent clinics or dispensaries, in addition to a similar service which is available for the people periodically through the above itinerant service. The total number of examinations conducted in these local clinics approximated 55,000 in 1937. The total number of annual clinic examinations throughout upstate New York is between 90,000 and 100,000. Exhibit C shows the distribution of diagnostic clinic service.

The total number of special beds for tuberculosis in upstate New York is 10,326 as compared with 2,716 deaths. Of these beds, 5,537 are in state and local tuberculosis hospitals and the balance in private hospitals or other state institutions. The ratio of total beds to deaths is 3.8 and the ratio of special public beds to resident deaths is 2.4. Exhibit D shows the geographic distribution of public tuberculosis hospitals.

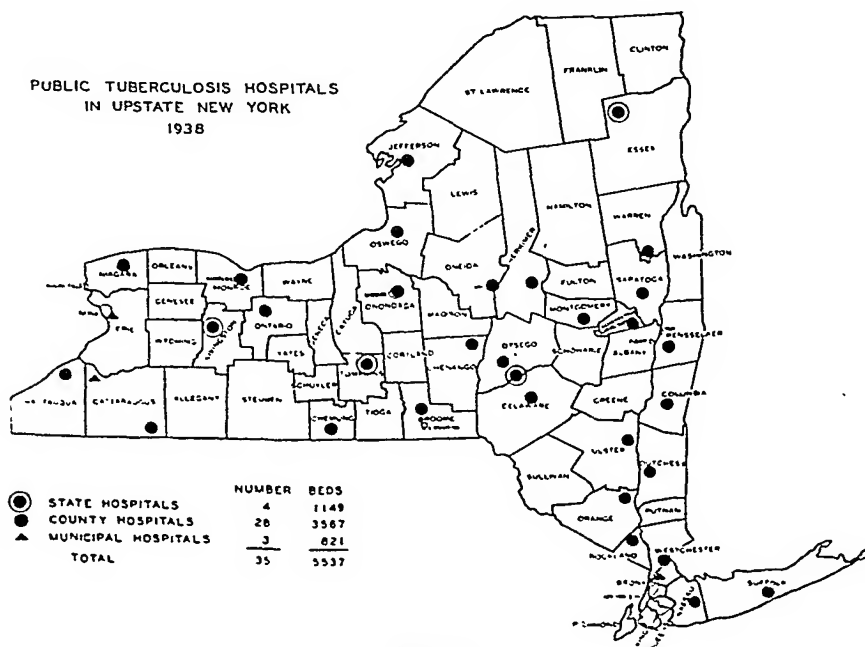
In 1930, the State Health Commission, following an intimate study of the

tuberculosis control problem in New York State, recommended that the state construct 3 new tuberculosis hospitals and add an infirmary to Ray Brook, the one state tuberculosis hospital then existing, in order to provide hospital and other control facilities not then available in 25 counties.

Each of these hospitals has been constructed in the population center of the area served. Each acts as the hub of the wheel of tuberculosis control. A continuity of medical service from case finding through treatment and follow-up of both patient and family prevails in each hospital. Tuberculosis is approached on a family and community basis, while the patient is treated as an individual.

The fact that practically 100 per cent of the general practitioners participate and coöperate by having their patients examined and studied by the hospital staffs, has contributed more to the success of these hospital programs than any other single factor.

Each state hospital conducts an active consultation type of out-patient service within the hospital and through



clinics held throughout each county in the area. Patients are admitted to the clinics by a request card signed either by their family physician or the local health officer. All patients are referred back to their physicians for a report of the examination, which is completed in detail and mailed to the referring physician. Copies of these reports are sent to the district state health officer and the local public health nurse for assistance in follow-up work.

In this clinic service, emphasis is placed upon the history of contact with a known case of tuberculosis. Patients who have experienced such contact, as well as patients who are referred by their family physicians because of suspicious symptoms or physical signs, comprise the patient attendance.

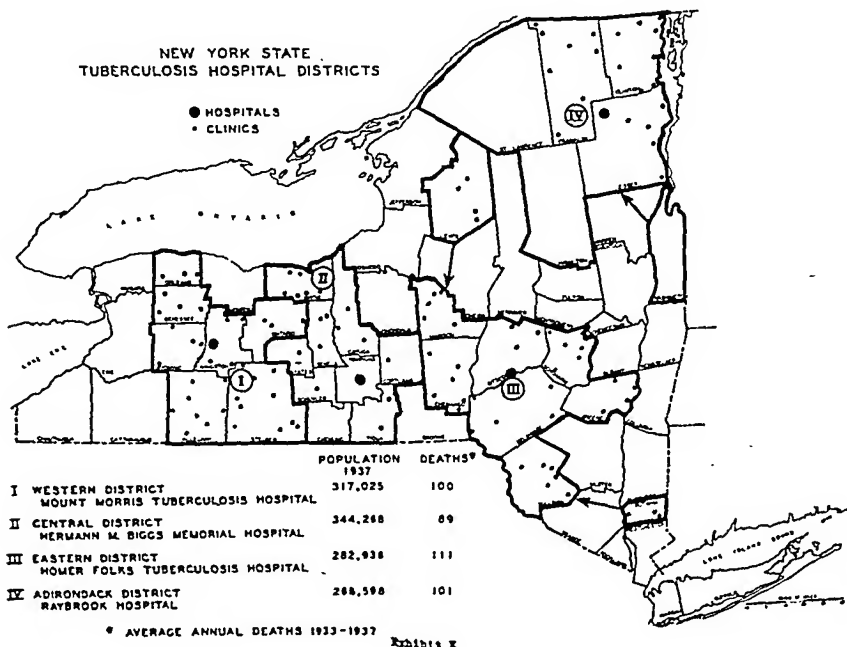
These hospitals have been in operation for approximately 3 years, and during the past 2 full years of clinic administration a total of 21,804 individuals, comprising 1.8 per cent of the total hospital area's population have been examined. The yield in newly discovered cases of tuberculosis among

these patients was 3.1 per cent. About 50 per cent of the patients were examined because of history of contact. Of real significance is the fact that of those patients found with tuberculosis because of the history of contact, 67 per cent were in the minimal stage of their disease, in contrast to 40 per cent of those who presented themselves to the clinic because of symptoms. Exhibit E shows the outline of these tuberculosis hospital areas.

Patients are admitted to the hospitals for special study or treatment either by applying through their family physician, health officer, or directly to the superintendent of the hospital.

Each hospital maintains a more detailed case register for its district than that of the district state health officer. All families in which tuberculosis may be a problem are indexed in detail as to their status regarding infection, chest X-ray, contact with sputum positive case, clinical status, and other social and epidemiological data.

Complete medical and surgical facilities are available in each hospital. All



nurses are registered, and all physicians are employed full time. One full-time thoracic surgeon has been performing the major operations during alternate visits to the 3 new hospitals, although each hospital has a resident surgeon. The surgical program in Ray Brook will be started on July 1, with the employment of an additional thoracic surgeon.

The care and treatment of orthopedic patients are directed by the physicians in our Division of Orthopedics by periodic visits to each hospital.

Research and teaching characterize all phases of the program in each hospital. For many years, medical students have had the benefit of residence teaching at Ray Brook, and this service, together with teaching programs through affiliation with schools of nursing, is continually carried on in the 3 new hospitals.

Although the laboratory in each hospital conducts all routine examinations, each one is carrying on studies in different fields of research—in one, bacteriology; in a second, physiology of respiration; in a third, special studies relating to the tissue reaction to the tubercle bacillus, and in the fourth, pathology. In this manner, duplication of work is avoided and the special resources of any one laboratory are available to all the hospitals.

Among the special studies relative to the epidemiology and pathogenesis of tuberculosis which are being carried on are:

1. X-raying of workers in heavy industries and dusty trades (8,500 already completed)
2. Periodic tuberculin testing and X-raying of students in 9 state teachers' colleges (6,000 examined to date)
3. X-raying of patients and employees in mental hygiene hospitals, where the tuberculosis death rate approaches 812 per 100,000
4. Continuing and periodic examination and reexamination of 2,300 inmates of a school for feeble-minded
5. Similar tuberculin testing and X-ray

study of 500 inmates of a state institution for delinquent girls

6. X-raying of 5,000 adult admissions to general hospitals

7. X-raying of 1,500 employees in a food production plant

8. Continuing detailed studies of the economic factors in tuberculous families, in relation to the individual, the family, and the community.

In addition to the above, other special studies—either as a part of routine administrative procedures or as special projects—are being conducted regarding such detailed aspects of the control problem as: Circumstances influencing the reporting of tuberculosis cases by private physicians; the longevity of tuberculosis patients following the onset of symptoms or the diagnosis; the relative value of the various methods of treatment, including collapse therapy; the appraisal of various routine administrative methods used in clinics, dispensaries, and tuberculosis hospitals; the determination of significant and helpful factors favoring the rehabilitation of patients and their reestablishment as self-sustaining persons in the community.

SUMMARY

To spread tuberculosis a human being must have an open lesion. The epidemiology and the study of the control of tuberculosis present a more complex problem than almost any other of the communicable diseases for which the cause is known. The transmission of infection occurs most frequently among persons in intimate contact with the patient who has the disease. Of all persons who become infected with the tubercle bacillus, only a small percentage develop the reinfection type of tuberculosis. Pulmonary tuberculosis is a disease primarily of adults. Environmental factors seem to have a more common influence on the development of disease than do the constitutional factors. The most common en-

vironmental denominator found in the tuberculosis problem is the almighty dollar. A vicious circle is formed by poverty and tuberculosis and tuberculosis and poverty. Before many specific factors can be individually evaluated, more information must be obtained. If, however, our present knowledge could be applied to our present and future medical and public health practices, the mass behavior of tuberculosis would be changed. The

tremendous amount of needless suffering, the unnecessary deaths, and the enormous economic losses resulting from the disease can be appreciably reduced. They should be.

From the foregoing, it is evident that the tuberculosis control program of the New York State Department of Health embraces all of the accepted procedures. Facilities for administrative control are universally available throughout every section of the state.

Athletics for Girls

THE American Public Health Association was represented at the 16th annual meeting of the Women's Division of the National Amateur Athletic Federation in San Francisco in May by Pauline Brooks Williamson, Chief of the School Health Bureau of the Metropolitan Life Insurance Company.

The National Amateur Athletic Federation is an affiliated organization of the American Association for Health, Physical Education and Recreation.

In her report to the Executive Board, Miss Williamson points out that the National Amateur Athletic Federation has throughout its history encouraged

the democratic principle of a sport or game for every girl and not for just the few who excel. The Federation believes that every girl should be given an opportunity to participate in sports according to her needs as revealed through a thorough medical examination and by her interests and ability. Competition that stresses enjoyment of sport and the development of good sportsmanship is emphasized rather than those types that aim at the making and breaking of records, the winning of championships for the enjoyment of spectators, or the athletic reputation or commercial advantage of institutions and organizations.

Occurrence, Pathological Aspects, and Treatment of Fluoride Waters*

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ADEQUATE proof that minute amounts of fluorine as fluorides in drinking water produce an imperfect enamel structure in the teeth during the formative period of the enamel has created a serious problem in water supply, not only throughout the nation, but throughout the world in general. Furthermore, the action of fluorine may not be confined to the teeth, but may have pathological effects upon other parts of the body structure. On the other hand, no proof has been brought forward to show that it is altogether a useless or harmful element rather than an element active and needed in minute

quantities such as is the element of copper. That body well-being can be maintained on extremely minute quantities of fluorine as it can be on minute quantities of the essential element iodine is found in the fact that many waters contain only very small quantities of fluorine yet cause no outstanding apparent defects in body metabolism. Few waters can be found that do not show as much as 50 micrograms of fluorine per liter, which is the approximate amount of iodine required daily to prevent simple goiter.

The problem, without doubt, is to provide drinking water which contains

TABLE I

Showing Relation of Fluoride to Incidence of Mottled Enamel in Children

City and State	Fluoride Content in p.p.m.	Composite of 9, 10, and 11 Year Old Children	
		Number of Children Examined	Incidence per 100 Children
Junction City, Kans.	0.7	115	1.7
East Moline, Ill.	1.5	110	24.5
Webster City, Iowa	1.6	72	26.4
Clovis, N. M.	2.2	138	71.0
Plainview, Tex.	2.9	77	87.0
Amarillo, Tex.	3.9	229	89.5
Conway, S. C.	4.0	59	88.1
Lubbock, Tex.	4.4	164	97.6

* Read before the Public Health Engineering Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 27, 1938.

a minimum amount of fluoride, since mottled enamel, which is produced at levels of at least 1 p.p.m. and above, is certainly evidence of definite ab-

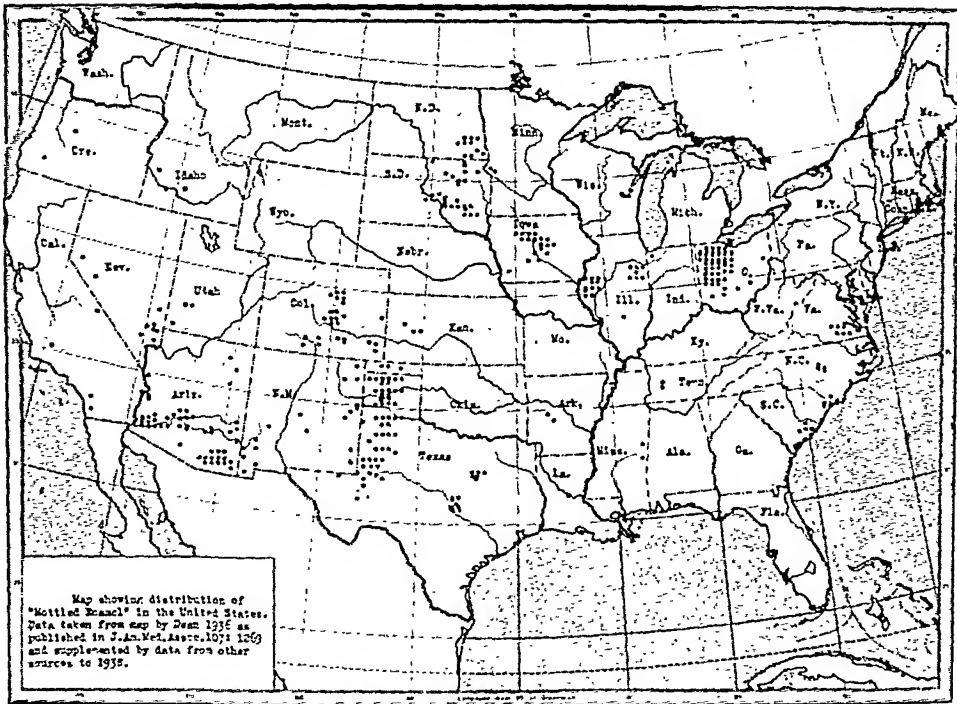


FIGURE I—Distribution of mottled enamel in the United States up to 1938

normal physiology, as proved by Dean, Dixon, and Cohen.¹

In Table I, taken from report by Dean and Elvove,²⁷ are shown data for the incidence of mottled enamel in children correlated with the fluoride content of waters from widely separated cities in the United States. Such a correlation as shown is rather conclusive evidence that fluorides alone are responsible for the mottled enamel since the mineral content of these waters and the diets of the children examined from so many divergent localities are bound to be different.

Water supplies low in fluorides must be obtained either by the selection of a suitable water free from excessive amounts of fluorides or treatment of unsuitable supplies to reduce the fluoride to the "safe" level. Waters known to contain excessive amounts of fluorides are widespread throughout the United States and evidence is fast accumulating that such waters are found widely distributed throughout the

world. In Figure I is shown the distribution of areas known to have mottled enamel and in most cases the waters are known to contain excessive fluorides. The question naturally arises: From what stratum or source do these fluoride waters arise? McKay in 1918² pointed out that the inhabitants of many endemic areas used artesian water. He also pointed out that the artesian waters of the great plains were obtained from the Dakota sandstone and that the original source of this water was the east side of the Rocky Mountain watershed. In general fluoride waters are derived from wells but not necessarily from sandstone. In Ohio³ many of the fluoride waters appear to rise in the limestone. In the Colorado Springs area the surface water from Pike's Peak watershed seems to be the source of the fluoride, and such water entering the western outcrops of the Dakota sandstone and underlying sedimentary formations at the Rocky Mountains may furnish the

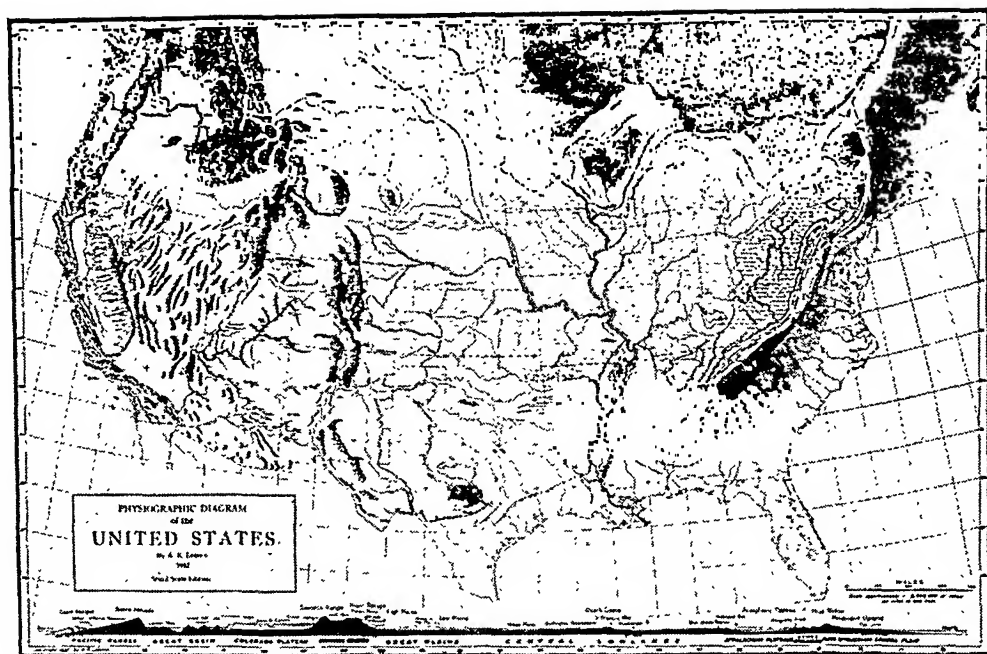


FIGURE II—Areas of igneous rocks (dark) with possible relationship to entrance of percolating fluoride waters

fluorides in many places in the western plains, including the large endemic area of northwestern Texas.

In Figure II a relief map of the United States shows the general geologic conditions. Note the Piedmont areas adjacent to the igneous protrusions into which drainage water from igneous formation percolates. The presence of mottled enamel in areas adjacent to Mt. Vesuvius in Italy appears to have been associated with waters which had their origin on the laval surfaces of that volcano. In gases from volcanoes and fumaroles fluorine compounds⁵ have been found. Geologic data bearing on the probability of procuring fluoride-free ground water would provide assurance to the municipality that a given well development would probably be successful. That such data ever will permit of definite interpretation is by no means certain since fluoride compounds are very widely distributed in many types of rock formation.

Since fluorine is a very reactive ele-

ment it is seldom found free in nature. Calcium fluoride, fluorite, CaF_2 and cryolite the double salt of sodium and aluminum with fluorine are two of the naturally occurring minerals which contain large quantities of fluorine. The origin of all fluorine bearing minerals is of course the igneous rocks underlying all sedimentary formations. Recorded analyses of several thousand igneous rock structures as compiled by Washington⁶ and which give results for fluorine in about two hundred analyses, show this element to be present in about 85 per cent of the igneous rocks tested. The amount of fluorine contained in these rocks varied from 0.01 to 3.36 per cent, with an over-all average of 0.23 per cent.

In Table II are given results showing that there were only 40 rocks of the 172 that contained more than the average amount of fluorine and that of these there were only 8 which contained the element in amounts above 1.0 per cent. Fluorine was found in not only many different kinds of rocks but it

TABLE II

Showing Distribution of Fluorine Content as Found by Analyses of 172 Igneous Rocks from Different Parts of the World

Content of F. Per cent Incl.	Number of Different Rock Specimens Showing F.	Per cent of Total Numbers of Rocks Showing F.
0.01 to 0.05	57	33.2
0.06 to 0.09	35	20.3
0.1 to 0.23	40	23.3
0.24 to 0.50	19	11.0
0.51 to 1.00	13	7.6
1.01 to 3.36	8	4.6
Above 3.36	None	
Total	172	100.0

was also rather evenly distributed among the various classes of igneous rocks. The occurrence of fluorides in sedimentary formations seems to be still more erratic than that in primitive rocks.

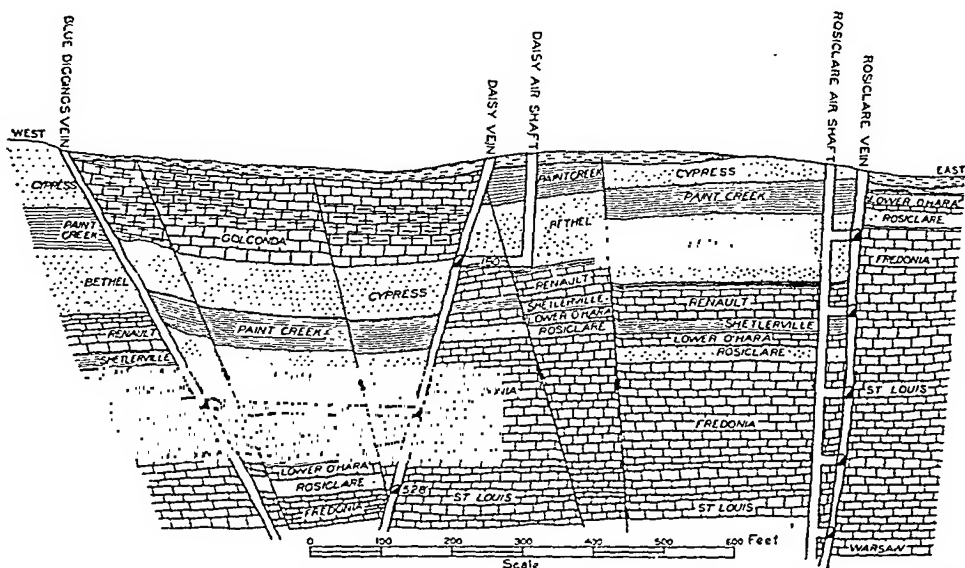
A study of the fluorspar deposits of southeastern Illinois and northwestern Kentucky shows that these were laid

down along fault and fissure lines as shown in Figure III, which is taken from work by Bastin.⁷ Note that the fluoride is laid down vertically and horizontally as a vein mineral in these deposits. According to Fohs⁸ these deposits of fluorspar were depositions resulting from thermal waters laden with fluorides or fluorsilicates arising in the igneous rock formations, ascending and spreading laterally through these fissures which developed along the faults in the sedimentary formations. He states:

These several deposits occur both filling open cavities and as replacement of adjacent rock . . . Likewise they occur in tabular deposits, filling vertical or inclined faults or fissures, as horizontal deposits along bedding planes, faults or replacing bedded strata and filling stock works: hence irregular in outline.

There is in these findings an indication that faults and fissures which extend upward from primary rock strata are important geologic signs of fluoride bearing waters. Near the location of the fluoride water area in northeastern

FIGURE III—Faults and fissures in sedimentary formations permitting thermal magmatic fluoride bearing waters to ascend and spread laterally (*Drawing from Bastin*)



Diagrammatic cross-section showing stratigraphic and structural relations in the vicinity of Rosiclare.

Wisconsin are known to exist faults, and their proximity suggests a possible cause for these few fluoride waters of that state. A similar condition exists in the fluoride area between Moline and Peoria, Ill. The derivation of fluor spar deposits suggests also that no particular limestone strata can be held responsible for fluoride waters but that any of the sedimentary formations could be interspersed with fluoride deposits. It appears, however, that replacement deposits as well as deposits filling cavities are more likely to occur in limestone formations since these are known to be subject to channel formations which are favorable to depositions as well as re-solution.

Sundstrom and McKee¹⁰ show by means of well packers that fluoride in amounts of about 2.0 p.p.m. is present in both limestone and sandstone water from a well drilled 916 feet to granite in Wisconsin's fluoride area.

Fluorapatite, $\text{Ca}_5(\text{PO}_4)_3\text{F}$, is another mineral which may be responsible for the presence of fluorides in natural waters, as it is a rather common constituent of all classes of rocks—igneous, metamorphic, and sedimentary, and forms the source of fluorine in the phosphate rock deposits of Florida, Tennessee, Virginia, Idaho, and Montana. The fluorine content of these materials varies from practically zero to 4 per cent, and the presence of this element in these products, which are used both for fertilizer, as a supplementary mineral in stock feeding, and as a source of phosphate in baking powders, has occasioned much experimentation on the physiological effect of fluorine on both animal and plant life.

PATHOLOGICAL ASPECTS OF FLUORIDES

De Eds¹¹ and McClure¹² have recently made excellent reviews of the subjects up to 1933. Of the vast amount of material available in this literature of nearly 150 articles, only a few out-

standing points can be given here. Fluorine as fluorsilicates, sodium fluoride, rock phosphate, and calcium fluoride show toxicity to the animal body in the order given and in comparatively small amounts. Leake in 1928¹³ showed 87.5 mg. of sodium fluoride per kg. when given intravenously to be fatal for rabbits in about 40 minutes. Many cases of fluoride poisoning of humans are to be found in the literature and as little as 4 gm. has proved fatal when taken by stomach.

The chronic poisoning by fluorides is an entirely different matter. Here the changes in body tissue are gradual and adjustments to the fluoride intoxication are made so that pathological evidence of toxicity is difficult to gather. Interpretation of animal toxicity experimentation in terms of human reaction is frequently difficult. It is a well known fact that the dose of certain drugs for dogs is 15 times as much as for man on an equivalent weight basis. Differences in life span and age at chemical maturity as well as species tolerances of adverse environment need be given their proper value when transposition of experimental results are made. Thus, Smith, Lantz, and Smith¹⁴ noted in their preliminary experiments on St. David water (F. from 4.2 to 7.1 p.p.m.) that "No destructive effect of the St. David water on the teeth of the rats was noticed when the diet was adequate in all respects." However, when rats were given this same water concentrated by evaporation to 10 times the original mineral content (F. 42 to 71 p.p.m.) gross defects (mottled enamel) occurred in the teeth within 1 month's time. While on the other hand, children using the unconcentrated St. David water developed mottled enamel practically 100 per cent. Such a result is explained on the basis of the rapidity of growth of the tooth structure of the rat as compared to humans.

Evidence has also been obtained that

the fluoride in some tissue may be present as an immobilization phenomenon since analyses have shown it to be present in all tissues. In muscle it is found present from 0.4 to 4.6 p.p.m.; from 1,180 to 1,800 p.p.m. in dental enamel, with a value of 700 p.p.m. for bone calculated to a dry basis. Normal results for fluorine in tissue is difficult to ascertain since all foodstuffs have been found to contain fluorine in varying amounts depending upon the locality of production. Analyses show an average of over 5 p.p.m. for fluoride in 32 edible food substances and 26.5 p.p.m. for 63 plant products with more fluoride in leaves than in stems and in skin of fruit than in pulp.¹²

Phillips, Hart, and Bohstedt¹⁵ found that an intake of 2 to 3 mg. per kg. of body weight per day (1.5 gm. of fluoride per cow) was the upper limit of tolerance for dairy cows. Even at this level toxic changes are manifest in the teeth and bones as seen from photographs by these authors. The fluorine content of the bones and teeth of these same dairy cows as reported by Chang, Phillips, Hart, and Bohstedt¹⁶ showed a great increase (10 to 20 times, depending upon the amount of fluoride fed), but liver, muscle, hair, and hoof remained practically unchanged. The thyroid glands, however, increased in fluorine content from 125 to 240 times the normal. Data by Evans and Phillips¹⁷ just published (1938) show fluoride content of the thyroid gland in hyperthyroidism to vary from 1.5 to 95 p.p.m. and all those containing more than 20 p.p.m. of this element were associated with a high basal metabolic rate, with one exception.

Sharpless and McCollum¹⁸ in answer to the question, "Is fluorine an indispensable element in the diet?" state in part that: "No difference could be noted between these and the control rats which were fed fluorine" (an amount equivalent to that taken on a

normal diet). "The rats on the low fluorine diet looked very well, were quite fat, and on the whole appeared normal." The teeth of these low fluorine rats were free of fluorine as far as could be determined, yet showed no gross deficiency or defect. From the description of the diet and methods of analyses used by these authors their low fluorine diet contained less than 1.0 p.p.m. F.

Ellis and Maynard¹⁹ used rats and fed sodium fluoride or bone meal equivalent in fluorine content to the extent of from 8 to 14 p.p.m. in a diet which contained 3.0 p.p.m. fluorine. They noted deposition of fluorine in bones and teeth with a lightening of the enamel in the teeth of those fed the diet plus added fluorine. No lightening occurred in those eating basal diet with 3.0 p.p.m. fluorine.

While no definite knowledge is yet available to show that fluorine is necessary for body function, there is much definite evidence that it is a toxic poison whose intake should be reduced to the lowest limit possible. Mention should be made of the recent finding of Dean,²⁰ however, that the dental caries attack rate is only about one-half as great in those children using fluoride waters and having mottled enamel as in children using water low in fluorides.

THE TREATMENT OF FLUORIDE WATERS

In those geographic areas in which excessive amounts of fluorides (1.0 p.p.m.) are present in the water supply the authority has three courses of action from which a choice need be made. (1) Remove the fluoride from the supply then in use. (2) Sink other wells in a different locality or stratum as advised by a competent geologist with the hope of procuring a safe and satisfactory supply low in fluorides. (3) Develop any available surface water supply which is found to be low in fluoride, adequate in quantity, and

capable of treatment by ordinary purification procedures so that a safe and suitable water may be obtained.

In many areas removal of fluoride seems to be the only method available since no surface supplies are obtainable and all ground waters show fluorides. Such a situation is reported to be present in the Texas "Panhandle" fluoride area which, according to Dean, Dixon, and Cohen,¹ constitutes the largest mottled-enamel area in the United States. Laboratory and semi-plant scale experimentation on the removal of fluorides followed rather slowly the discovery that fluorides in amounts above 1.0 p.p.m. was the cause of mottled enamel in teeth. Boruff²¹ published the first results on removal and came to the conclusion that treatment of water with alum (10 gr. per gal.) would reduce the artificially prepared sodium fluoride waters from 5.0 p.p.m. to less than 1.0 p.p.m. Activated alumina was found efficient in reducing the fluoride content from 5.0 p.p.m. down to from 0.5 to 2.3 p.p.m., depending upon the rate of filtration and quantity of water treated. He also reported a 60 per cent reduction by lime softening.

Swope and Hess²² carried out tests with Defluorite (activated alumina at that time) on Chetopa, Kans., water with a resulting reduction in fluoride content from 6.2 to less than 1.0 p.p.m., but such a process, to the author's knowledge, has not been employed by any municipality.

Scott, Kimberly, Van Horn, Ey, and Waring³ have found that fluorides may be removed by lime treatment at high pH values provided the water contains sufficient magnesium. Such treatment to be effective required removal of 91 p.p.m. magnesium in order to reduce the fluoride from 3.0 to 1.0 p.p.m., the safe level.

Elvove²³ has reported that fluorides can be removed from water with the

aid of tricalcium phosphate, magnesium oxide, or magnesium hydroxide, but states that the question of cost must be solved before it can be applied on a practical basis. MacIntire and Hammond²⁴ and Adler, Klein, and Lindsay²⁵ nearly simultaneously, have published experiments on fluoride removal by means of tricalcium phosphate with similar success but the latter authors appear to have pointed to a rather practical means of application of the treatment, that is, by using it as a filtering material. It is of interest to note that these authors prepared their chemical from commercial phosphoric acid of high purity and milk of lime of such proportions that a mixture of hydroxyapatite $3\text{Ca}_3\text{P}_2\text{O}_8\text{Ca}(\text{OH})_2$ and tricalcium phosphate $\text{Ca}_3\text{P}_2\text{O}_8\text{H}_2\text{O}$ results and constitutes the material now sold as Defluorite.

Regeneration of the bed with 1 per cent sodium hydroxide followed by washing, neutralization of residual alkali with dilute HCl and subsequent washing was practised but about 3.0 per cent of bed was lost per regeneration. They found this chemical to have more than twice the capacity of activated alumina used by Swope and Hess or 1.8 gm. of fluoride per kg. of filter bed. The initial cost of this removal material, the fact that 3 per cent of the bed was lost with each regeneration, besides the cost of chemicals for regeneration, have militated against any notable installations of the process.

Recently, Behrman and Gustafson²⁶ have improved the method of regeneration of Adler, Klein, and Lindsay²⁵ by the use of carbon dioxide in place of hydrochloric acid for the neutralization of residual alkali and have shown that the filter bed of chemical can be used indefinitely without any loss of filtering material. Moreover, it is possible to employ ordinary materials of construction and equipment when carbon dioxide is the neutralizing agent. The improve-

ment is covered by a patent application. Since only a very small fraction of a water supply is used for drinking and cooking, individual household units have been proposed which will treat a stated quantity of water of certain fluoride content, but if these are not controlled, a false sense of security will prevail at times when the capacity of the unit is spent.

Experimental work done in this laboratory with softening a water containing a total hardness of 240 p.p.m. with a fluoride content of 2.8 p.p.m. reduced the fluorides to 1.3 p.p.m. This water when treated with 10 grains of alum per gallon and filtered shows 50 per cent removal of fluorides. Neither ferric hydroxide nor hydrated manganese dioxide had any sorptive effect upon the fluorides.

Many phases of the fluoride problem are still unsolved and with the results of extended experimentation into the physiological effects of minute amounts of fluorides may come a demand upon both the chemist and geologist for fluorides lower than the present permissible limit of 1.0 p.p.m.

REFERENCES

1. Dean, H. T., Dixon, R. M., and Cohen, Chester. *Pub. Health Rep.* 50, 13:424-442 (Mar. 29), 1935.
2. McKay, Frederick S. *J. Nat. Dental A.*, 5:721-750, 1918.

3. Scott, R. D., Kimberly, A. E., Van Horn, A. L., Ey, L. F., and Waring, F. H. *J. Am. W. W. A.*, 29:9-25, 1937.
4. Darton, N. H. Professional Paper, *Bull.* 32 and 17th *Ann. Rep.* U. S. Geol. Survey, 1895-96, p. 676.
5. Clarke, F. W. The Data of Geochemistry. *Bull.* 695, U. S. Geol. Survey, 1920, p. 256.
6. Washington, H. S. U. S. Geol. Survey, *Professional Paper No.* 99, 1917.
7. Bastin, Edson S. Illinois State Geol. Survey *Bull.* 58, 1931, p. 31.
8. Fohs, Julius F. Kentucky Geol. Survey *Bull.* 9, 1907.
9. Bain, H. Foster. U. S. Geol. Survey *Bull.* 255, Plate V, opp. p. 55.
10. Sundstrom, V. B., and McKee, F. J. Unpublished data given at Wisconsin Section of American Waterworks Assoc. at Green Bay, Wis., 1937.
11. De Eds, Floyd. A review. *Medicine*, 12:1-60 (Feb.), 1935.
12. McClure, F. J. *Physiol. Rev.*, 13:277-300 (July), 1933.
13. Leake, C. D. *J. Pharmacol. & Exper. Therap.*, 33 *Proc.* 1928.
14. Smith, M. C., Lantz, E. M., and Smith, H. V. *Tech. Bull.* 32, University of Arizona, College of Agr., 1931.
15. Phillips, Paul H., Hart, E. B., and Bohstedt, G. *Res. Bull.* 123, Agr. Exp. Sta., Univ. of Wisconsin, 1934.
16. Chang, C. V., Phillips, Paul H., Hart, E. B., and Bohstedt, G. *J. Dairy Sci.*, 17:695-700, 1934.
17. Evans, R. J., and Phillips, P. H. *J.A.M.A.*, 111:300-302, 1938.
18. Sharpless, G. R., and McCollum, E. V. *J. Nutrition*, 6:163-178, 1933.
19. Ellis, G., and Maynard, A. *Proc. Soc. Exper. Biol. & Med.*, 35:12-16 (Oct.), 1936.
20. Dean, H. T. *Pub. Health Rep.* 53, 33:1443-1452, 1938.
21. Boruff, C. S. *Indust. & Eng. Chem.*, 26:69-71, 1934.
22. Swope, H. Gladys, and Hess, Robert H. *Indust. & Eng. Chem.*, 29:424-427, 1937.
23. Elvove, Elias. *Pub. Health Rep.* 52, Sept. 17, 1937, pp. 1308-1314.
24. MacIntire, W. H., and Hammond, J. W. *Indust. & Eng. Chem.*, 30:160-162, 1938.
25. Adler, H., Klein, George, and Lindsay, F. K. *Indust. & Eng. Chem.*, 30:163-165, 1938.
26. Behrman, A. S., and Gustafson, H. *Indust. & Eng. Chem.*, 30:1011-1013, 1938.

Morbidity and Mortality From Scarlet Fever in the Negro

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SCARLET fever is one of the communicable diseases which have been said to be less prevalent in the Negro than the white population. Ever since the census of 1879,¹ when for the first time comparative statistical data over any extensive area showed a ratio of 69.2 deaths from scarlet fever in the Negro to 1 in the white as compared with the ratio of 6.3 to 1 for deaths from all causes, various observers have commented on this difference. However, most of these investigators have based their statements on the recorded mortality rates for the southern states published annually by the Bureau of the Census. These differences for scarlet fever are well shown in Table I.²

No one has made a comparison of the scarlet fever experience of the Negro population in the South with that of the North, nor has this been contrasted with that of the white population in these two regions. In order to study this problem, questionnaires requesting the number of deaths and cases for certain age groups for each year from 1930 through 1934 were sent to the health officers of 13 southern states, 10 northern cities with large Negro populations, and 10 southern cities. Because the Bureau of the Census has not published estimates of population according to race since 1933,

rates were only computed for the 4 year period, 1930-1933. There are still several cities and states which do not compile their cases or deaths from scarlet fever according to age or race, and therefore in one or two instances, the interpretation of the data must necessarily be limited.

The data in Table II show the mortality rate from scarlet fever for both races in certain states and cities. For both races the death rates in the southern states and cities are lower than in the northern communities. In practically all instances, the colored mor-

TABLE I
*Mortality Rates from Scarlet Fever Among
Colored and White of 10 Southern
States, 1920-1933*

	Scarlet Fever	
	Colored	White
1920	0.54	2.09
1921	0.57	2.12
1922	0.42	1.97
1923	0.51	1.78
1924	0.36	1.47
1925	0.38	1.39
1926	0.45	1.56
1927	0.30	1.56
1928	0.42	1.45
1929	0.37	2.27
1930	0.44	1.81
1931	0.36	2.17
1932	0.29	1.60
1933	0.47	1.99

tality is also lower than the white, but this difference is greatest in the southern states, where the ratio of Negro to white deaths is 3.7 to 1; less marked in the southern cities, 2.4 to 1, and least in the northern cities where the ratio is 1.8 to 1.

TABLE II

Mean Mortality Rates from Scarlet Fever for All Ages of White and Negro Population in Certain States and Cities, 1930-1933, inclusive

	Mean Mortality Rates per 100,000 Population for 4 Year Period, 1930-1933	
	White	Colored
<i>Southern Cities:</i>		
- Atlanta	3.9	1.6
Baltimore	2.6	1.2
Birmingham	1.8	0.3
Louisville	2.8	0.5
Memphis	2.3	...
Nashville	1.9	...
New Orleans	1.2	0.7
Norfolk	0.3	1.7
Richmond	0.8	1.4
<i>Northern Cities:</i>		
Chicago	5.0	3.1
Cleveland	4.1	1.3
Detroit	2.6	1.5
Newark	1.2	...
New York	1.2	0.4
Philadelphia	2.3	2.4
Pittsburgh	2.5	1.7
St. Louis	3.9	2.0
<i>Southern States:</i>		
Alabama	1.7	0.2
Arkansas	1.3	0.2
Florida	0.6	0.2
Georgia	1.5	0.4
Kentucky	3.1	1.6 *
Louisiana	0.8	0.2
Mississippi	0.9	0.2
North Carolina	1.9	0.2
South Carolina	1.3	0.3
Tennessee	2.0	0.6
Virginia	1.9	0.6

* 1930-1932

The question whether this disparity in mortality may not be due to differences in the age distribution of both races may well be discussed at this

juncture. This factor does not seem to have any influence whatsoever. Pevaroff and Hindman³ investigated this matter and demonstrated that the disparity in mortality from scarlet fever in the two groups existed even after the rates were adjusted for differences in age distribution. Table III shows this well.

The distribution of deaths in the different age groups seems to be very similar for both races in the North and South. The significant fact, shown in Table IV, is the marked concentration of deaths in the age group 0-5 years in both races in most of the cities and states. In practically all of the communities from one-half to three-fourths of all the deaths among white and colored persons occurred in children under 5 years. Doull⁴ was among the first to call attention to this phenomenon in the white population in temperate and tropical climates. He explained the occurrence in the North on the basis of the degree of aggregation of population; while in the South he attributed it to one or all of 3 factors: a corresponding concentration of cases, an increase in the relative case fatality in the younger ages, or a development of an early and widespread immunity of the southern population.

When we turn our attention to the case fatality rates, certain differences are to be recorded. In Table V, it is observed that in 12 of the 16 communities, the case fatality rates are higher for the Negro than for the white. As with the mortality rates, the inequality in the case fatality rates for the two races is greater in the southern states and cities than in the northern cities. For the southern states the group fatality rates are 1.5 and 3.1 for white and Negroes respectively; for the southern cities, 1.1 and 1.9, and for the northern cities, 1.3 and 1.2. One could well ask whether the higher case fatality rate in the Negro in the South is not due to

TABLE III
Scarlet Fever Mortality in Whites and Negroes in 10 Southern States

State	Period	Average Annual Death Rate per 100,000 *	
		White	Colored
Florida	1919-1929	0.89	0.26
Georgia	† 1922-1929	1.11	0.28
Kentucky	1917-1929	2.15	1.14
Louisiana	1918-1929	0.63	0.14
Maryland	1917-1929	2.38	0.81
Mississippi	1919-1929	0.97	0.31
North Carolina	1917-1929	1.59	0.36
South Carolina	1917-1929	0.86	0.25
Tennessee	1917-1929	1.99	0.71
Virginia	1917-1929	1.83	0.44
Average for 10 States		1.63	0.36

* Rates adjusted for differences in age distribution, standard population used being that of continental U. S. A., 1910.

† Out of registration area 1925-1927, inclusive.

TABLE IV
Percentage of Deaths from Scarlet Fever Occurring in Different Age Groups, 1930-1933

	Per Cent Deaths Under 5 Years		Per cent Deaths 5-9 Years		Per cent Deaths 10 and Over	
	White	Colored	White	Colored	White	Colored
<i>Southern Cities:</i>						
Atlanta	52	67	24	..	24	33
Baltimore	43	57	36	..	21	43
Birmingham	42	100	42	..	17	..
Louisville (1933)	29	..	14	..	57	..
Memphis	27	..	33	..	40	..
Nashville	67	..	33	..	..	..
New Orleans	31	..	38	50	31	50
Norfolk	..	67	..	..	100	33
Richmond	25	33	75	67	..	..
<i>Northern Cities:</i>						
Cleveland	40	75	32	25	28	0
Detroit	41	38	41	50	18	12
Newark	58	..	21 *	..	21 †	..
New York	46	50	27	17	27	33
Pittsburgh	43	50	31	..	26	50
St. Louis	19	50	23	..	58	50
<i>Southern States:</i>						
Alabama	70	71	22	29	8	..
Arkansas	67	50	21	50	11	..
Florida	48	25	16	25	36	50
Georgia	61	60	23	..	16	40
Louisiana	50	20	29	20	21	60
Mississippi	55	40	37	30	8	30
North Carolina	55	29	27	28	18	43
South Carolina	61	50	24	38	15	12
Tennessee	56	46	29	27	15	27
Virginia	48	21	28	43	24	36

* 5 to 14 † 14 and over

TABLE V

Mean Fatality Rates from Scarlet Fever for All Ages of White and Negro Population in Certain States and Cities, 1930-1933, inclusive

	Mean Fatality Rates for 4 Year Period, 1930-1933	
	White	Colored
<i>Southern Cities:</i>		
Atlanta	1.4	4.7
Baltimore	1.0	1.9
Birmingham	1.2	1.8
Louisville	1.0	1.2
Memphis	0.9	...
Nashville	1.4	...
<i>Northern Cities:</i>		
Chicago	1.9	2.2
Cleveland	1.2	0.4
Newark	0.5	...
Philadelphia	0.8	1.7
Pittsburgh	0.9	1.1
St. Louis	2.4	1.8 *
<i>Southern States:</i>		
Alabama	2.0	2.7
Louisiana	1.5	2.6
Mississippi	1.0	5.1 †
North Carolina	1.4	1.9

* 1932-1933

† 1931-1933

poorer reporting of cases in this region. The fatality rate for different age groups is also of interest, although interpretation is limited here because of the meagerness of data. For both races, North and South, the fatality rates are higher under 5 years of age. This is very well shown for the white population. The data in Table VI seem to show, however, that in both regions the rate is higher in Negro than in white children under 5 years of age.

It has been repeatedly said that scarlet fever is less prevalent in the South than North, and less in the Negro than in the white population. The data in Table VII do not seem fully to support these contentions. It is true that for both white and colored the morbidity rates are lower for the South than North; however, the white morbidity rates are very low in the 4 southern states; but in the 9 southern cities, the rates are very nearly as high as those of the 6 northern cities. Turning to the differences between the two races, it is found that in the southern states and cities this is quite marked. For the southern cities as a group, the

TABLE VI

Fatality Rates from Scarlet Fever in Different Age Groups, 1930-1933

	Fatality Rates Under 5 Years		Fatality Rates 5-9 Years		Fatality Rates 10 and Over	
	White	Colored	White	Colored	White	Colored
<i>Southern Cities:</i>						
Baltimore	2.1	4.1	0.7	...	0.8	2.7
Birmingham	2.3	7.7	0.9	...	0.8	...
Memphis	1.2	...	0.7	...	0.9	...
Nashville	3.2	...	1.0	...	...	...
New Orleans	1.6	...	0.8	4.2	1.2	5.9
Richmond	0.3	1.4	0.5	2.5	...	...
<i>Northern Cities:</i>						
Cleveland	2.7	1.1	0.8	0.2	1.1	...
Pittsburgh	1.9	2.7	0.5	...	0.7	2.2
St. Louis	2.1	3.0	1.2	...	4.2	3.5
<i>Southern States:</i>						
Alabama	4.6	7.0	1.0	1.5	0.6	...
Mississippi	1.7	9.1	0.9	1.9	0.3	7.1
North Carolina	2.7	1.8	0.8	1.2	0.9	2.9
Virginia (1933)	3.1	2.9	1.3	3.2	0.8	3.5

TABLE VII

Mean Morbidity Rates from Scarlet Fever for All Ages of White and Negro Population in Certain States and Cities, 1930-1933, inclusive

	Mean Mortality Rates per 100,000 Population for 4 Year Period, 1930-1933	
	White	Colored
<i>Southern Cities:</i>		
Atlanta	283.3	34.7
Baltimore	256.4	61.6
Birmingham	146.2	13.6
Louisville	251.0	38.7
Memphis	326.9	19.5
Nashville	144.9	3.5
New Orleans	113.2	21.9
Richmond	260.3	93.9
<i>Northern Cities:</i>		
Chicago	259.4	141.1
Cleveland	338.9	325.1
Newark	233.7	162.7
Philadelphia	284.6	139.2
Pittsburgh	298.1	152.0
St. Louis	88.3	109.1 *
<i>Southern States:</i>		
Alabama	82.9	6.9
Louisiana	52.6	6.2
Mississippi	83.9	3.8 †
North Carolina	136.8	10.1

* 1932-1933

† 1931-1933

morbidity rate is 6.2 times higher than that of the Negro, while for the southern states the ratio is 13.1 to 1. On the other hand, this does not seem to be the case in the northern cities. The ratio of white to Negro morbidity rate in these 6 cities is only 1.5 to 1. Thus, as with the mortality rate and the case fatality rate, the morbidity rate shows the greatest inequalities in the southern states, less in the southern cities, and least in the northern communities. It is also to be noted that there is as much disparity between the morbidity rates of the northern and southern Negro as between the southern white and Negro. The rates for the Negro in the northern cities were on the average 4.8 times

higher than that of the Negro in the southern cities, and 25.2 times higher than that of the Negro in the 4 southern states.

The distribution of cases according to age groups does not seem to show any essential differences between the two races. The only noteworthy fact in Table VIII is the concentration of cases not in the 0-5 year group as would be expected on the basis of the concentration of deaths, but in the age group 5-9 years. From 40 to approximately 60 per cent of the cases of scarlet fever fell in this age group in both races and geographical areas. The uniformity of these percentages is rather striking. Thus, the opinion of Doull that the concentration of deaths in the younger ages in the South may be partly due to a concentration of cases in this period does not seem to find support in Table VIII.

DISCUSSION

The marked differences in the mortality and morbidity from scarlet fever in the white and Negro population in the South have led investigators to state that this disease is not common in the Negro and that therefore he is highly resistant to it. This resistance has been explained on the one hand on his resistant ectoderm,⁵ and on the other hand, on the assumption of a longer racial experience than that to which the white race has been subjected.⁶ These two explanations, however, do not seem to hold true when two facts are considered. In the first place, our data show that although there are great differences in the South, there is in the northern cities very little inequality in the mortality and morbidity rates from scarlet fever in the white and colored populations. If the Negro were highly resistant to this disease, even though his mortality and morbidity in the North and South might not be similar, the disparity between the two races

TABLE VIII

Percentage of Cases from Scarlet Fever Occurring in Different Age Groups, 1930-1933

	Per cent Cases Under 5 Years		Per cent Cases 5-9 Years		Per cent Cases 10 and Over	
	White	Colored	White	Colored	White	Colored
<i>Southern Cities:</i>						
Baltimore	21.2	27.1	50.0	41.8	28.7	31.0
Birmingham	22.9	23.6	52.7	60.0	24.4	16.4
Louisville	17.9	24.3	43.2	45.9	38.8	29.7
Memphis, 1931-33	20.8	27.4	41.5	50.0	37.7	22.6
Nashville	28.9	16.7	45.4	50.0	25.6	33.3
New Orleans	21.3	29.3	50.0	41.4	28.7	29.3
Richmond	24.0	35.7	43.6	40.2	32.4	24.1
<i>Northern Cities:</i>						
Chicago	23.4	30.2	47.9	41.6	28.7	28.2
Cleveland	18.1	28.1	51.7	52.9	30.2	19.0
Newark	23.7	8.9	49.0	32.1	27.3	58.9
Philadelphia	32.8	25.7	55.2	57.5	11.9	16.9
Pittsburgh	19.4	22.3	49.3	51.3	31.3	26.4
St. Louis, 1932-1933	21.9	30.7	45.2	42.8	32.9	26.5
<i>Southern States:</i>						
Alabama	31.1	26.9	44.6	49.4	24.3	23.6
Georgia, 1932-1933	28.9	24.2	39.9	45.5	31.1	30.3
Mississippi, 1931-1933	28.0	18.8	47.0	45.3	24.9	35.9
North Carolina	28.3	28.8	45.8	43.5	25.8	27.7
Virginia, 1933	22.3	22.7	43.1	38.8	34.6	35.6

would be just as great in the North as in the South. This has not been shown in our data.

Secondly, the idea of racial susceptibility must be discarded when the results of Dick test surveys are considered. Pevaroff and Hindman⁷ in Cleveland, Smythe and Nesbit⁸ in Gary, and others have shown that there is no significant difference between reactions of white and Negro children to the Dick test.

The recorded low mortality and morbidity from scarlet fever in Negroes in the South may be explained on two facts—(1) the occurrence of very mild and subclinical cases which are not recognized and not reported; and (2) on the very poor reporting of typical cases and deaths in the rural areas of the South where almost 70 per cent of the southern Negroes are to be found.

That very mild and atypical cases of scarlet fever must occur widely in

the South draws support from the results of Dick test surveys made in certain tropical countries. Doull⁹ in Rio de Janeiro, Dubois¹⁰ and Van Slype¹¹ in Belgian Congo, and Nazario¹² in Puerto Rico, have shown the higher prevalence of negative Dick tests and the earlier appearance of this immunity in children in the tropics. No differences were found between Negroes and whites. Mayer and Davison¹³ have similarly shown that although in North Carolina, the number of cases reported was less than half that in New York City, yet the rate of susceptibility was much lower than that found in various other comparable groups in the United States. Thus, it must be assumed that there is a wide prevalence of mild and atypical cases in the South.

Of more importance in accounting for the low recorded mortality and morbidity from scarlet fever in the Negro in the South is the poor reporting of

cases and deaths of typical scarlet fever. It was noted in our data that more cases and deaths were reported in the southern cities than in the states. Lack of medical facilities must account in a large measure for this disparity. Seventy per cent of the Negroes of the South live in the rural areas, and it is in these regions that the lack of hospitals and physicians is greatest. For example, the 4 states, Pennsylvania, Ohio, New York, and Illinois, with a population of about 2,000,000 Negroes, have 900 Negro physicians; while the states of Georgia, Mississippi, Alabama, and North Carolina, with twice as large a Negro population, have but half as many Negro physicians. In the United States as a whole, there is 1 physician for every 785 persons, but in the State of Mississippi, there is only 1 Negro physician for every 14,000 Negroes.¹⁴ Thus, many typical cases and deaths from scarlet fever must occur in the Negro which are not seen by physicians and, therefore, not reported.

Poor reporting of deaths and cases in the Negro in the South is substantiated from another angle by the investigations of Puffer¹⁵ and Gover.¹⁶ Puffer states that there seems to be marked incomplete registration of colored deaths in the rural area as shown by the large variation in the colored death rates in the counties of Tennessee. She also observes that in 15 rural counties of West Tennessee where the colored population is large, 17.7 per cent of the death certificates were not signed by physicians, and, further, that the colored death rates from ill-defined and unknown causes of death for 1933 for Mississippi, Alabama, Tennessee, South Carolina, Georgia, and Arkansas were over 100 per 100,000 population. Thus, in Mississippi, the cause of death was unknown in 1 in 5 deaths. Discussing this same fact, Gover states that the

rate for ill-defined causes for 1931-1933, in 14 southern states, for the age group under 5, was 4 times higher in the Negro than in the white.

SUMMARY

1. The differences in scarlet fever mortality and morbidity rates between the Negro and white is greatest in southern states, and least in northern cities. In the latter, there is very close approximation between the Negro and white rates.

2. The case fatality for all ages seems to be higher for the Negro in all communities both North and South. This is true particularly in the age group under 5.

3. The concentration of deaths for Negroes and whites in practically all communities is in the age group 0-5 years while the cases are concentrated in the period 5 to 9 years. There are no significant differences in the two races.

REFERENCES

1. Holmes, S. J. Differential Mortality in the American Negro. *Human Biology*, 3:71-106 (Feb.), 1931.
2. Gover, Mary. Mortality Among Southern Negroes Since 1920. *Pub. Health Bull.* 235 (June), 1937, p. 39.
3. Pevaroff, H. H., and Hindman, S. M. The Dick Test in White and Negro Children Resident in a Congested Section of Cleveland. *Am. J. Hyg.*, 19:749-752 (May), 1934.
4. Doull, James A. Variations in the Age Distribution of Mortality and Morbidity for Diphtheria, Scarlet Fever and Certain Other Diseases. *Am. J. Hyg.*, 8:633-648 (July), 1928.
5. Holmes, S. J. The Resistant Ectoderm of the Negro. *Am. J. Phys. Anthropol.*, 12:139, 1928.
6. Doull, J. A. Comparative Racial Immunity to Diseases. *J. Negro Educat.*, VI, 3:429 (July), 1937.
7. Pevaroff, H. H., and Hindman, S. S. *Op. cit.*, p. 4.
8. Smythe, M., and Nesbit, O. B. The Dick Test and Immunization Against Scarlet Fever. *J. Prev. Med.*, 2:243, 1928.
9. Doull, J. A. The Results of Shick and Dick Tests in Rio de Janeiro. *J. Prev. Med.*, 1:513, 527, 1927.
10. Dubois, A., and Degotte, J. Resultats de la Reaction de Dick chez quelques Indigenes de Nepoko. *Am. Soc. Belg. Med. Trop.*, 4:435, 1934.
11. Van Slype, W. Dick Test in Natives of Belgian Congo. *Am. Soc. Belg. de Trop. Med.*, 15:269-272, 273-275 (June 30), 1935.
12. Nazario, R. R., and Otero, M.P. Dick Tests in Puerto Ricans. *Porto Rico J. Pub. Health & Trop. Med.*, 12:34-38 (Sept.), 1936.
13. Mayer, W. B., and Davison, W. D. Prevalence of and Susceptibility to Scarlet Fever in North Carolina. *South. M. J.*, 22:835-838 (Sept.), 1929.
14. Lewis, Julian H. Negro Physicians in the U. S. *J.A.M.A.*, 104:1272 (Apr. 6), 1935.
15. Puffer, R. R. Measurement of Error of Death Rates in the Colored Race. *A.J.P.H.*, 27:603 (June), 1937.
16. Gover, Mary. *Op. Cit.*, p. 1.

Control of Syphilis in a Southern Rural Area*

A Preliminary Report

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THE purpose of this program is to determine the most effective method of controlling syphilis in the southern rural Negro. Has the mobile clinic a place in such a program? Does it have an advantage over the stationary clinic? What is the most efficient way to obtain blood tests on all inhabitants? Do case finding and case holding activities prove worth while with the southern rural Negro? If so, what kind of worker can do these best? Can these Negroes be taught the facts about syphilis, and if so what are the best methods?

The U. S. Public Health Service in coöperation with the Georgia State Department of Health and the Glynn County Board of Health established this program in September, 1937, in an attempt to answer these questions. Effective control programs already had been established for white people in some of the northern states. No such program for the Negro was in progress in the South. Yet the South has a large Negro population—25 per cent—1 out of every 4 of whom has syphilis. The solution of this Negro health prob-

lem is essential if we hope to control syphilis in the United States.

LOCATION OF PROJECT

Three coastal counties, McIntosh, Glynn, and Camden, in southeast Georgia were selected. They comprise a District Health Department in which a syphilis program had been in progress for several years. The office of this department is in Brunswick, the county seat of Glynn, the center county.

The population of the 3 counties is 31,491, of which one-half are colored. Approximately half of this population is in Brunswick.

The land consists chiefly of pine woods and swamps, sparsely settled. Very little farming is done. Outside of Brunswick, the chief industries are turpentine, lumber, and fishing.

There are no large towns. The settlements are mainly centered around the turpentine camps. The Negroes live off the highways, back in the woods for convenience to work. This makes transportation one of the chief difficulties in providing these people with treatment for syphilis.

SYPHILIS CONTROL PROGRAM'S

PERSONNEL

One physician administers the program and operates the trailer clinics.

* Read before the Health Officers Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 26, 1938.

Accompanying him are one white nurse and one Negro nurse. The white nurse prepares and assists in the administration of neoarsphenamine. The Negro nurse gives the intramuscular injections of bismuth under the supervision of the assistant physician. Both nurses give diphtheria toxoid, and typhoid and smallpox immunizations, take blood smears for malaria, dispense atabrine, and collect specimens for hookworm.

The follow-up personnel consists of 1 white female, 1 white male, and 2 Negro nurses.

There are stationary clinics held in Brunswick, on the islands of Sapelo, St. Simons, and Sea Island. These are cared for by the Commissioner of Health with the aid of a contract physician and 2 nurses. These clinics take care of the larger centers of population, leaving the more sparsely settled portion for the trailer clinics. Two stenographers complete the personnel.

THE WAY WE BEGAN

A one day census survey of sources of treatment in the three counties was completed. Four hundred thirty-seven cases of syphilis were reported as being under observation or treatment during the survey period. The rate for syphilis was found to be 5 times as great in the colored race as in the white. In the white race, the rate for the two sexes was practically the same; while in the colored race, the female showed 35 cases per 1,000 as compared to 28 cases per 1,000 for the male.

The difficulty experienced in holding patients with syphilis under treatment was well illustrated by this survey. The majority lapsed before the end of the first year and in no case had a patient received minimum protective therapy (at least 20 injections of arsphenamine with 20 injections of heavy metal). Only 6 per cent had received as many as 20 injections of arsphenamine.

The private physician was treating only 12 per cent of the cases of syphilis and these were in the hands of 45 per cent of the physicians. It was found that 95 per cent of the Negro patients were in the clinics and but 67 per cent of the white patients.

Next, we interviewed the leading citizens in all the communities, the owners of the turpentine stills, lumber camps, and shrimp fisheries, the superintendents of the other industries, Negro preachers, Negro school teachers and Negro midwives. Our program was explained to them. Their assistance and coöperation were requested.

Ten clinic locations were selected as a beginning, using Brunswick as our base. Posters advertising these clinics were distributed all over the three counties. They were tacked upon churches, stores, telephone poles, and similar places. They were given also to grocers and butchers to give out with purchases. Negro preachers announced the clinics from the pulpit. Negro ministers and teachers have given us splendid coöperation and have been of invaluable assistance in our program. The news spread quickly as soon as our clinics began.

Shortly after, we arranged meetings at the various Negro churches, usually on Sundays. We would tell the essential facts about syphilis and the importance of having a blood test. Occasionally a movie was presented in an attempt further to illustrate these essential facts. However, we have not found any movie on syphilis suitable for a Negro audience. Movies available are not simple and plain enough for them to understand. The viewpoint must be different and the dialogue done in their own language.

After the meeting, we took blood tests on all the congregation, with the preacher setting an example. The church meetings are of more value from an educational and publicity standpoint

than for the actual number of blood tests taken. We have found that house-to-house canvassing by a Negro nurse to obtain blood tests is much more efficient. More persons are tested, very few are missed, and it is more economical. One nurse can go out even in the sparsely settled regions, in the woods and swamps and obtain an average of 40 blood tests a day.

There are other advantages to the house-to-house canvass. The nurse can assist very greatly in educating these people while she is taking the blood tests. Then, too, immunizations against diphtheria, typhoid, and smallpox can be given, combining syphilis with a general health program.

Every colored school in the three counties was visited and blood tests were taken on the children. All food handlers in the Health District must have blood tests before they are issued work cards. The larger industries in Brunswick have been practically unanimous in requiring blood tests on all employees.

As we progressed, we found clinics were needed in more places, and that one or two places we had selected first were not well situated. So, slowly but progressively, we have established new clinics until at present there are 24 trailer clinics held each week, traveling 500 miles. Some of these require an hour and a half, others shorter periods, depending upon the number of patients. We have been unable to establish clinics in certain small communities because of lack of time. At some of these, a Negro patient with a car will bring some fellow patients. Many times, the trailer will pick up the patients along the road and take them to and from the clinics. In one community, we have arranged for a school bus to make a circle of about 30 miles in order to collect patients and bring them to a central meeting place. This service has not only increased the attendance at this one clinic but has

decreased the number of lapsed patients.

OUR PROGRAM

Our first concern was to find the syphilis. We did this through blood testing as explained previously. Whether the test is taken on the trailer, in the home, or in the factory, we send individual letters to all persons, telling them whether their blood is good, bad, or doubtful. If doubtful, we request that they return for another blood test. If their blood is bad, we ask them to report to the nearest clinic, giving the day, time, and place. When the test is negative, we ask them to return in three months for another test. A surprisingly large number are returning.

The letter has several advantages. In the first place, we have found that more persons come in for treatment after receiving a letter than if they are told, when taking the test, to return a week later for the result. The letter does have a psychological effect, too. They like to receive letters, just as we all do, and particularly in a large, official looking envelope. They show it to their friends. They carry it around with them for weeks. It forms an impression upon them and even more important, makes and keeps them *blood test conscious*. Finally, it impresses upon the patient the result of the test. So many times a patient will say he had a blood test some time ago but either the doctor or clinic did not tell him the result, or, what happens more frequently, he did not go back. We believe our letter eliminates this complication. These letters take considerable time and effort to prepare but we are convinced from our limited experience that they are more than worth the trouble and expense.

The patient's history is taken, a physical examination is made, and he is placed under treatment. The physician attempts to obtain the source of infection and all contacts. To learn

the source is practically impossible. The majority of our cases are latent. Primary and secondary syphilis are rare. Naturally, as promiscuous as these people are, it is impossible to obtain the source of an infection obtained 2, 4, or 10 years ago. We do get marital contacts and extra-marital contacts of recent months. They cannot or will not remember contacts very far back. All sources and contacts are investigated and brought in for examination. We concentrate on those of the infectious cases but where there is time, we obtain the late latent contacts too.

Naturally our aim has been to find the early, infectious cases and give them a minimum of 20 each of arsenical and bismuth injections in order to render them permanently noninfectious. If they remain under treatment, we will attempt to obtain a cure, but our main objective is sterilization of the infectious man or woman.

Following the examination of the patient, the physician attempts to instill in him a few facts concerning syphilis—what the disease is, what happens from little or no treatment, and what consistent treatment will accomplish. I am afraid that in the majority of cases these little talks fall on deaf ears. Their reply is always "yas suh, yas suh," but one can almost feel that they do not comprehend what has been said. To supplement this talk, we give each patient the pamphlet prepared by the U. S. Public Health Service, *Syphilis, Its Cause, Its Spread, Its Cure*. Frankly, I do not know how much good this does. They all say they read it and understand most of it but they ask very few questions, which makes one doubt that they really have read it.

Force is used to hold patients in only three groups and one of these indirectly. All food handlers with syphilis must take treatment or lose their work card. In one small town we

received unasked assistance from the mayor. He became interested in our program and requested us to inform him of any patients in his city who refused to take treatment. We gave him the names of a few incorrigible ringleaders. He sentenced them to jail or to the clinic. They chose the clinic. This has had a beneficial effect upon the other patients in this community.

Through midwives we obtain blood tests on all pregnant women and treat those found infected. All midwives are licensed in Georgia. Failure to coöperate with us would mean a revocation of their license. We had one midwife bring an 8 months pregnant woman 14 miles to the clinic and they walked all the way.

We are often asked if the Negro does not dislike to come to a public clinic which advertises the fact that he has syphilis. Fortunately, the Negro is not so hypocritical as the white, or perhaps one might say that his moral code is not so stringent. Then, too, many do not relate "bad blood" with sexual relations, so there is no stigma.

They find out they have bad blood. Many are disappointed if their blood is good and want treatment, regardless. They all have a misery some place. They blame this on the bad blood. The treatment does act as a general tonic. They feel better and credit the shots. We are satisfied not to dispel their belief as long as they will continue treatment.

They really like to come to the trailer. It has become a social function with them, next to the church. There is a distinction for them to come into this clinic on wheels and receive treatment. It has a definite appeal. Then, too, they all like some medicine and they like it all the more because it is free.

The trailer was disabled for 4 weeks because of an accident. We arranged clinics in schoolhouses and churches,

but our patients dropped off very greatly. They returned as soon as the trailer was repaired. We believe that this is conclusive proof that the mobile unit has an advantage over the stationary clinic, at least with this group of patients.

Coöperation with the private physicians in the three counties forms a part of our program. This coöperation consists of consultation service, darkfield and serological examinations, free Keidel

tubes, free neoarsphenamine and bismuth for all cases, pertinent literature, particularly the supplements to *Venereal Disease Information* and, finally, a subsidy for the treatment of white indigent infectious cases and pregnant women.

We have found the physicians passively coöperative. Negro syphilis patients are poor pay; physicians would prefer we treat them. Only a few take advantage of our free drugs and sub-

Figure I

POSITIVE BLOOD TESTS IN NEGROES BY AGE GROUPS IN THREE GEORGIA COUNTIES
1937 - 1938

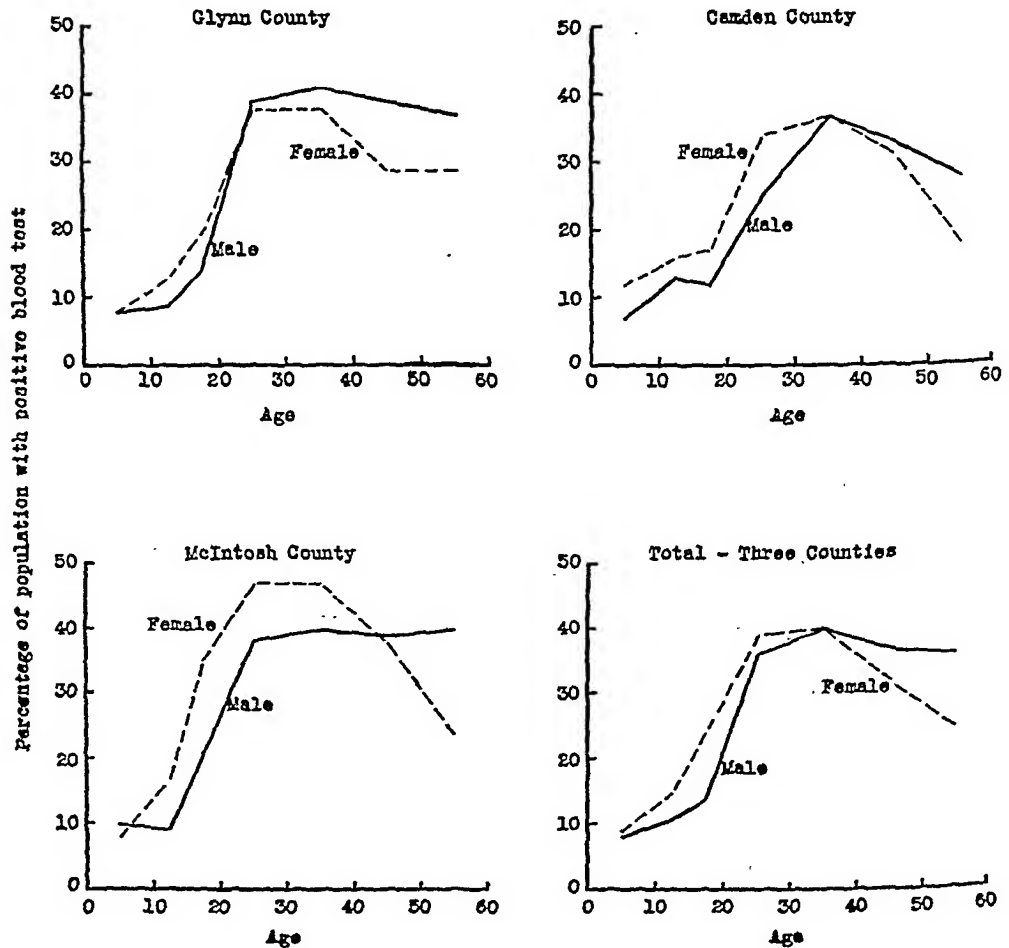


TABLE I

Positive Blood Tests in Negroes By Age Groups in Glynn, Camden and McIntosh Counties, Georgia, 1937-1938

Age	Male			Female			Total		
	Total Examined	Positive		Total Examined	Positive		Total Examined	Positive	
		Number	Per cent		Number	Per cent		Number	Per cent
0-10	970	80	8.2	991	90	9.1	1,961	170	8.7
11-15	700	74	10.6	1,007	148	14.7	1,707	222	13.0
16-20	638	87	13.6	867	207	23.9	1,505	294	19.5
21-30	1,201	428	35.6	1,582	622	39.3	2,783	1,050	37.7
31-40	759	304	40.1	979	388	39.6	1,738	692	39.8
41-50	453	169	37.3	620	197	31.8	1,073	366	34.1
51-60	313	111	35.5	319	79	24.8	632	190	30.1
60-	358	100	27.9	235	51	21.7	593	151	25.5
Total	5,392	1,353	25.1	6,600	1,782	27.0	11,992	3,135	26.1

sidization for white indigent infectious cases. However, more are sending patients for darkfield examination to us and we are called in more frequently for consultation. It is probably a matter of education and gradual realization of the assistance we can give.

Only two physicians in the three counties verbally object to our program. They feel that these Negroes, whose average wage is but \$6 a week, can afford to pay them \$2 to \$3 a week for anti-syphilitic treatment. Their criticism is sincere and frank, and we try to coöperate with them whenever possible. They have not injured our program in any way, however.

A recent addition to our program has been an attempt to obtain serological tests for syphilis on all the white people in the three counties. We began with one county. Public meetings were arranged at the larger centers of population under the sponsorship of the Parent Teachers Clubs of these communities. These meetings were advertised in the usual way, with posters, circulars, newspaper advertisements, and an article in the weekly newspaper by the president of the local Parent Teachers Club. In addition ministers announced the meetings from the pulpit.

We presented the slide film, "For All Our Sakes," and then talked to them very briefly about syphilis and why

they should have a blood test. Suitable literature was also distributed. No attempt was made to obtain blood tests at these meetings. However, those attending were informed that nurses in a house-to-house canvass would come to their homes within the next few days for this purpose.

The meetings were well attended. The people were interested. Refusals of blood tests were rare. Sixty-six per cent of the adult white population of the entire county were examined. Less than 2 per cent were positive. We sent individual letters to these people just as we had to the Negro patients.

Several weeks after we completed our canvass, a white mother brought her 12 year old daughter to the trailer and asked if we would take a blood test on her. She explained that the daughter had been away at the time of our survey.

We have begun a similar program in a second county and the results so far have been equally encouraging. We hope to make the entire population just as blood test minded as they are vaccination minded.

WHAT HAS BEEN ACCOMPLISHED

Eighty per cent of the Negro population in these three counties have been tested. Table I gives a statistical analysis of these blood tests for the

[illegible]

first 9 months. Twenty-five per cent of the males and 27 per cent of the females of all age groups were found to have a positive test for syphilis, giving a total of 26 per cent positive. This includes every Negro school child in the three counties, which naturally brought the positive percentage down considerably. Taking only those 16 years and over, the percentage of positive serology increases to 33 per cent. Figure 1 presents in graphic form the results of the blood tests by age groups

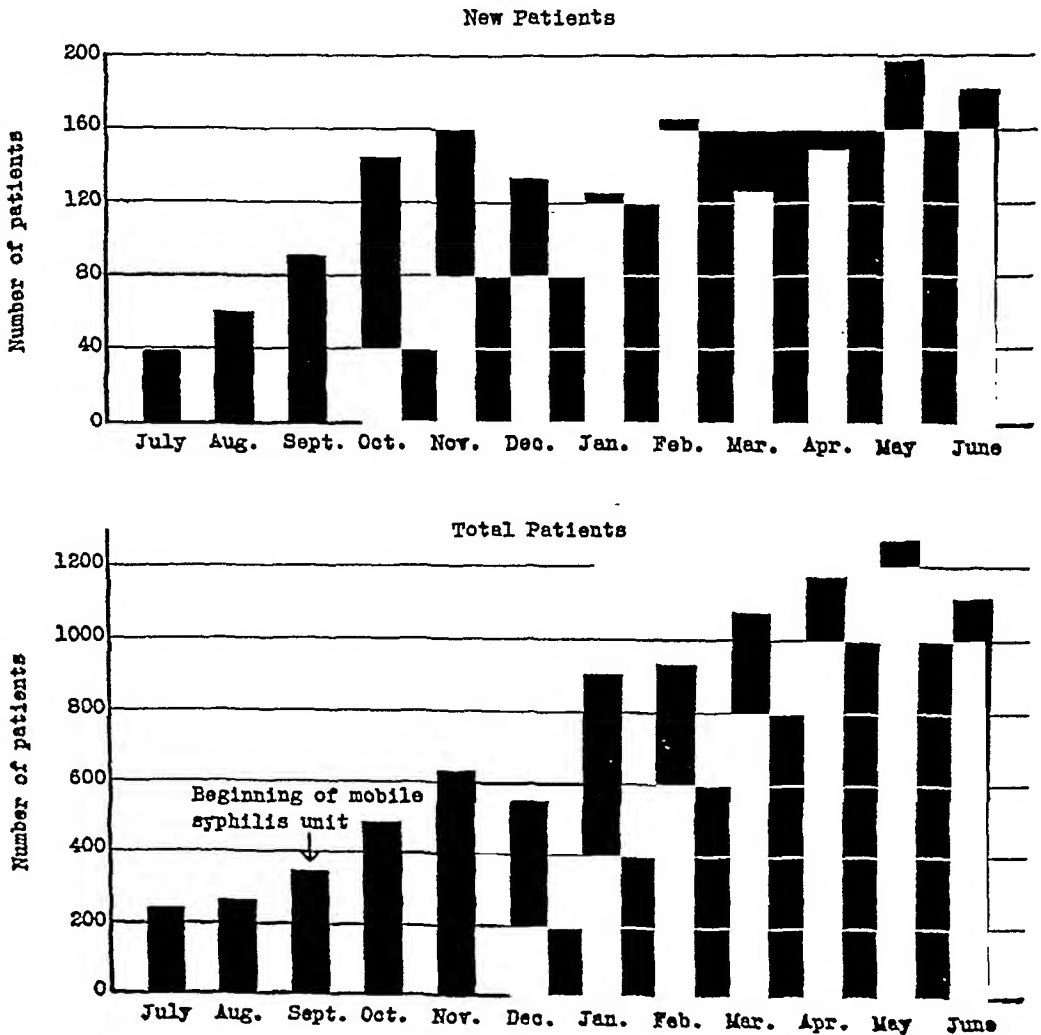
in each of the three counties. The females of one county in the 20 to 40 age group showed 47 per cent positive.

Glynn County coöperated in the Rosenwald Study of Syphilis in 1930. It is interesting to note that they found, as a result of their serological survey, 26 per cent positive. We found, in the same county, 7 years later 27 per cent serologically positive for syphilis.

Seventy-seven per cent of those found to have a positive serology for syphilis were brought in for examination and

Figure II

SYPHILIS PATIENTS ATTENDING CLINICS IN MCINTOSH, GLYNN AND CAMDEN COUNTIES, GEORGIA, DURING 1937 - 1938



treatment. Figure II presents graphically the increase of new patients and the increase of total patients in the three counties since the trailer clinics began. Twenty-two hundred fifty-eight Negro patients were examined and treated during the past 11 months. The classification by age and stage of infection of these patients is given in Table II.

Eleven hundred and fourteen patients lapsed from treatment, excluding those that moved away, died, or were dismissed from the clinics. Sixty-eight per cent of these lapsed patients were returned to treatment. The chief reasons for lapse are:

	<i>Per cent</i>
Employment	23.7
Lack of interest.....	15.8
(Had no real reason)	
Illness	14.0
Treatment discomfort.....	11.6
Intramuscular injections of bismuth..	9.9
Inconvenience to clinic.....	9.8
Out of town temporarily.....	7.8

Case holding constitutes our greatest problem. We are hoping that education may eventually lighten the load of the follow-up worker.

OUR CONCLUSIONS THUS FAR

1. The mobile syphilis clinic has a definite

place in the control of syphilis among the southern rural Negroes. We believe it has many advantages over the stationary clinic. A large amount of territory can be covered. Clinics can be held where there would be no available place for a stationary clinic. The ease and swiftness of operation is a decided advantage, less than 5 minutes to set up and 5 minutes to close up. There is the added advantage of convenient examination and treatment facilities. Negro patients like to come to the trailer for treatment. Other health measures can be combined with syphilis, particularly immunization. It makes a good advertisement for general health programs and aids materially in health education. Finally, the mobile unit is economical. It has cost an average of \$52.52 a month for gasoline, oil and washing.

2. We believe that the house-to-house canvass for obtaining blood tests is the most efficient method of finding syphilis.

3. Case holding is essential to the success of this program; case finding less so because we find our syphilis in the house-to-house serological dragnet. We believe also that the successful follow-up worker is a type rather than a result of education or training, at least for work among the southern Negro. It is probably more efficient to have a nurse of this type than a social worker because she can combine general health work with syphilis.

4. We believe that the Negro can be taught, slowly, the facts about syphilis and the necessity for treatment. This can best be accomplished by talking movies, simple literature, and through Negro ministers and school teachers. The movie is probably our best medium for education of the Negro, but, unfortunately, there is no movie at the present time suitable for such an audience.

Public Health Nursing Program of the Future*

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IT was the late Dr. William Welch who listed the public health nurse as one of the outstanding contributions which America has made to the cause of public health. It is safe to say that there is not a health officer today who does not gratefully echo this evaluation. Certain it is that the public health nurse has become a central figure in the modern public health campaign.

While it is relatively easy, from past experience and present performance, to arrive at an evaluation of the public health nurse in the general picture of today's public health program, it is not so easy to say what the future of the public health nurse in this picture will be. In fact, it would be folly to attempt to predict the future with any degree of finality. However, reviewing the development of the public health nursing service, there appear several rather suggestive changes in the application of this service which may serve as indices for possible future changes.

First, we note the recognition of the need for more than the traditional bedside care. The patient is best helped if he learns to help himself. This calls for the instruction of the patient in the

essentials of personal hygiene and instruction in the specific requirements outlined by the attending physician.

To the city of Boston, in this country, must go the credit for recognizing this opportunity in visiting nurse service and for being first in the field by establishing the first "Instructive District Nursing Association" in 1886 expressly for this purpose.

From then on, as Winslow¹ has pointed out, "We find the teaching of hygiene as a recognized objective for the district nurse along with the care of the sick in their homes."

With the extension of medical science, especially the discoveries in bacteriology and the development of societies organized for the purpose of applying this newer knowledge for the study and prevention of various health problems such as tuberculosis, infant and maternal mortality, etc., we find the instructive visiting nurse as the constant and increasingly important coworker of the physician.

Inevitably, as the various special health problems were attacked, nursing service developed *pari passu* into as many specialties.

We find, accordingly, the nurse specialist for tuberculosis, for infant welfare, for maternal welfare, for school medical supervision, for communicable diseases, for preschool serv-

* Read before the Public Health Nursing Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 25, 1938.

ice, for mental hygiene, for dental service, for cancer control, for industrial hygiene, etc.

This trend toward undue specialization in the activity of the public health nurse brought about the next major change in the service of public health nursing. It was recognized that the visiting of several specializing nurses in the same family was not only uneconomical from an administrative viewpoint, but was also apt to prove confusing and, at times, irritating to the family.

Furthermore, the nurse specialist, by intensifying her attention on just one particular problem was likely to narrow her viewpoint and so overlook other health needs of the family which obviously could, and should, have been dealt with at the same visit.

The reaction to these criticisms of specialized public health nursing found expression in the present form of the generalized educational system under which the visiting nurse is to attend to all of the public health nursing problems in a district of not more than 2,000 population, dealing with the family as a whole.

The future of the public health nursing program calls for consideration mainly of two points, namely, the quantitative and the qualitative needs of the service.

Taking first the quantitative needs of the public health nursing service, one comes readily to a conclusion. If the present ratio of one nurse for each 2,000 of population is sound and justified then the expansion of the service is clearly indicated since it appears that the prevailing ratio in urban communities is about 1 to 4,000 population, and rural areas have nursing service of only 1 to 9,000 to 1 to 11,000 of population.

On the basis of the indicated standard ratio of public health nurse to population there can be no question that this service needs expansion. That

this service will see expansion seems also certain. As Sigerist² points out, the history of medicine proves that, "The community will obtain the medical care it wants."

That the community or the public is rapidly becoming more and more health conscious and is becoming vocal in its demand for health service was clearly demonstrated recently in the National Health Conference held in July, 1938, in Washington, D. C.

Significant too is the endorsement which the American Medical Association has given to the general expansion of public health service, including nursing service.

While popular demand as well as endorsement by the medical profession gives reasonable assurance for the quantitative or numerical expansion of the public health nursing service, there is no similar definite expression concerning the character or the qualitative side of such nursing service as this is likely to expand in the future.

Let me make it clear at once that I have in mind here, specifically, a declaration of plan or policy concerning public health nursing service by departments of health as the official agencies organized to render service to the public.

The existence of such bodies as the National Organization for Public Health Nursing and the League of Nursing Education is ample evidence of the keen interest which the nursing profession is taking in the development of its service.

These organizations have done an extraordinarily fine job in developing³ public health nursing in this country and through their work have given this service the important keystone position which it justly occupies in the structure of present-day public health service.

It is, however, not with the detail of nursing technic that we are concerned here, but rather with the broad plans and policies of health departments in

utilizing nursing service for the protection and promotion of the public health.

Quite obviously, as medical science will add to its discoveries in dealing preventively or curatively with problems affecting health and life, the public health nurse will undoubtedly have her part in the program of service so far as this properly becomes a matter of public concern.

So, for example, venereal disease control, child guidance, the nutritional diseases, allergic disturbances, heart disease, and many other of the so-called chronic diseases, no doubt will increasingly see the participation of the services of the public health nurse.

In all of these activities there is represented merely an extension of service and not a change in the general policy that governs present-day public health nursing.

The most significant change that, in my judgment, will characterize the future program of public health nursing, so far as official agencies are concerned, will be in the resumption, or rather the extension of bedside care.

There is little doubt that in the development of the generalized educational plan of public health nursing now so generally followed by public health departments, the tendency has been to swing too far toward the purely educational approach and to omit more or less, if not entirely, the practical bedside care of the patient.

No doubt the development of this trend sprang from necessity rather than from a deliberate choice.

Bedside care, obviously, is quite time-consuming and nurses for public health agencies were hard enough to get. Furthermore the availability of the voluntary agencies who (fortunately) carried on the traditional bedside care service, created a tempting opportunity to try out the possibilities of the educational approach in public health problems.

The importance and value of instructing the patient and the family in what to do for themselves has been clearly demonstrated; there must be no neglect of this feature in public health nursing. However, it is equally clear that a public health nursing program that means to confine itself solely to the purely educational approach by verbal instruction will no longer satisfy the public demand for service. After all, teaching by demonstration is the best teaching. The public will better understand and appreciate the value of public health nursing when this service carries with it the realization of service that is of immediate recognized comfort and benefit to the patient and family.

Public health nursing in rural areas has of necessity remained closer to the practical bedside care type of nursing. It is my opinion that public health nursing in an urban setting must likewise resume more and more responsibility in the bedside type of service.

Assuming that such a change in the practice of public health nursing in official public health agencies is likely to come about, what will be the future of the voluntary agencies that now largely function in the field of bedside care?

Public health owes its development almost entirely to the initiative and demonstrations of voluntary agencies. It is the peculiar opportunity and privilege of the private agencies to do the pioneer or experimental work; to try out the new and when the value of the new has been demonstrated, to help further to make it the responsibility of official agencies established by government, to carry out public service.

In grateful recognition of the unique and important field of service in which the voluntary agencies have functioned, and are functioning, I sincerely hope that they may continue in this rôle for the benefit of the official agencies and the public in general.

Another feature in the public health nursing service which needs further development, is that of nurses' aides, for service in the home as well as for service in hospitals.

The public health nurse, as a professionally trained person, manifestly is entitled to a compensation commensurate with the cost of the years of training required of her, and the quality and responsibility of the service she renders.

There is, however, much in the character of work required for the patient in the home or in the hospital which represents purely manual labor. As a public service it may not be justified to have the time of a highly trained and proportionately relatively costly employee taken up by manual work which may just as satisfactorily be carried out by a less costly worker.

The increased utilization of nurses' aides or of visiting housekeepers, working under the supervision of the

public health nurse, seems a necessary and desirable adjunct to the public health nursing program of the future. Likewise, with the increasing variety of service which the public health nurse will be called upon to render it will become necessary to add nurse consultants who will be specialists in their respective fields and whose particular duty it will be to assist the field nurse in dealing with special problem cases.

These, it seems to me, will be some of the changes in the public health nursing program that will be likely to characterize the future of that service.

REFERENCES

1. Winslow, C.-E. A., Dr.P.H. *Evaluation of Public Health*. Yale University Press, 1923, p. 56.
2. Sigerist, Henry E., M.D. *The Medical Profession and the Public*. American Academy of Political and Social Science. Philadelphia, 1934, p. 31.
3. *Manual of Public Health Nursing*. Macmillan, 2nd ed. Rev., 1932.
Principles and Practices of Public Health Nursing. Macmillan, 1932.

Morbidity and Mortality Statistics as Health Information*

HUNTINGTON WILLIAMS, M.D., DR.P.H.

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THE public and the press are always eager to learn the latest news in regard to the general health situation in any given locality or health jurisdiction. Reports which include the figures for cases and deaths of various diseases for any given week or month almost invariably get an O.K. for publication by the city editor or his counterpart on the county weekly. Indeed, the systematic and periodic release of health information of this statistical type is a veritable cornerstone in any health education program.

Of course, the press expects the health agency supplying this material to give a local slant to the news release. There is usually a welcome for more than just the bare statistics. If a health officer or his bureau of health information makes a habit of recognizing the opportunity, comparisons with health reports from other parts of the country or the state or the county may be worked into the news release to very good effect. It has always been my feeling that a very short clipping containing nothing but figures on morbidity and mortality bespeaks a lost opportunity in the field of health education. I have wept many a tear at reading of a diphtheria death, because

the bare statistic stood alone without comment, and there was no mention of the preventive toxoid which might have saved the life of the child, if it had been given at the age of 6 months, or soon thereafter.

For a moment I would beg your indulgence in permitting me to describe what is referred to in my community as the *Saturday Letter to the Mayor* from the Commissioner of Health. I do this because of a desire to present a practical plan which has worked very advantageously for more than 20 years as a major item in the health education program of our City Health Department. The people of any community have a little more time to spend with their morning newspaper on Sunday than on any other day of the week. For this reason we always place a copy of the *Saturday Letter to the Mayor* on the city editor's desk for each of the two Sunday morning papers, as promptly as possible after noon each Saturday.

In the letter addressed to the Mayor, the Health Department, week by week, takes occasion to introduce, sometimes in quite brief paragraphs, information which it considers worthy of special public attention. This may be in the form of a warning, or an exhortation generally along "keep well" lines and associated with some disease that is prevalent or unusual. Occasionally there results nothing but the bare

* Read before the Public Health Education Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 25, 1938.

statistics in the Sunday morning papers, and this would be expected if there were a major diplomatic crisis in Europe or a hurricane sweeping across Long Island or New England. More commonly, however, the narrative and educational material upon which attention is focused in the letter to the Mayor appears in a corresponding article of major value in community health education.

The routine of sending the Saturday letter to the newspaper offices regularly each Saturday noon is never broken and the city editors look for this particular form of news release and even send a messenger to the Health Department every Saturday to assure its safe arrival.

It has occurred to me that you would be interested in knowing the type of headings which have appeared from Sunday to Sunday as a result of these efforts in health education which are based on the weekly morbidity and mortality statistics of our community. Out of 42 clipping heads from the two Sunday papers in 1938, 12 headings dealt with syphilis and 8 with diphtheria. Others dealt with scarlet fever, whooping cough, undulant fever, leprosy, tetanus, and dysentery. Samples of these are as follows:

Syphilis Cases Listed for Week Set Record.

Twenty-one Employees Asked in Drive on Syphilis.

Syphilis Control Is Under Way Here.

Syphilis Case Reports Double Previous Years.

Seven Diphtheria Cases Reported Here for Week.

Diphtheria Takes Its First Victim of Year; Inoculation Stressed.

No New Diphtheria Cases in Week.

Whooping Cough Death Cited in Health Report.

Undulant Fever Case Is Reported.

Leprosy Case Is Reported in Baltimore.

The system described in making use of morbidity and mortality statistics by this weekly report to the Mayor and the press, in reality is a method of carrying out actual provisions of the

City Charter and Ordinances which require the Commissioner of Health to keep the Mayor informed in regard to the health conditions of the community. The *Saturday Letter to the Mayor* was established by my distinguished predecessor, Dr. C. Hampson Jones, who was closely associated with the public health service of our community for a period of 36 years. It has become so automatic that it protects the Health Department itself from overlooking important items, omissions which might otherwise lead to some embarrassment. I would like to give you just one experience in this connection.

Some years ago we had a case of leprosy and, pending the confirmation of the diagnosis, the case was not recorded in the weekly statistical table. We had a very coöperative city hall reporter representing the press and I persuaded him to postpone public mention of the case of leprosy until I gave him a "go ahead" and he promised to coöperate in what I considered a most unusual manner. It was my hope to arrange with the U. S. Public Health Service for the transfer of this case to the federal leprosarium in Carville, La., and have the patient on his way before the news release was issued. A week later a Sunday morning headline reported the case of leprosy prior to my having said anything to my friend the city hall reporter and I was much disappointed. I reminded him that he had promised to hold this release and he smiled and told me that the case, after the diagnosis was confirmed, had automatically appeared in the statistical table which had reached the press *from my office with the usual Saturday Letter to the Mayor*. So you see the routine nature of this particular weekly news release is better even than the Health Department from which it comes and this incident has given us a good deal of comfort by way of assurance that no important health information is

likely to be withheld from the public.

There are many types of newspaper articles that have resulted from the *Saturday Letter to the Mayor* based upon statistical material and accompanying educational information. Food poisoning outbreaks, lead poisoning incidents, care in the handling of crab-meat and the necessity for the "pasteurizing" or reheating of custard-filled pastries have all been reflected in the public press in our community and in many instances directly because of the *Saturday Letter to the Mayor*. On the other hand, special items of public health interest, with educational information spread not too thickly, as in a sandwich, are given to the city editor over the telephone or by written individual or weekly or monthly news releases. Some of these result from our Tuesday morning radio broadcast or the periodic monthly appearance of *Balti-*

more Health News. The broadcasts are always under the joint auspices of the City Health Department and the State Medical Society, known in our state as the Medical and Chirurgical Faculty of Maryland.

It has been learned by experience that an extensive scrapbook and clipping book is of the utmost value if kept over the years, and our file of *Saturday Letters to the Mayor* is constantly in use as source material in health education.

In this discussion no effort has been made to cover the assigned topic in any complete manner. Rather I have sought to present for your consideration a particular routine procedure, aimed at making use of local vital statistics in a basic health education program, a procedure which has more than proved its usefulness in my own community.

The School Nurse as a Health Educator*

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SCHOOLS are basically educational agencies. If the purpose of all education is to help each individual to acquire the intelligent art of living fully and well, then whatever health work is sponsored by a school system should be of an educational nature. Such education will fail to function unless the principles presented to the learner are accepted by him as important to his welfare, and unless he willingly puts what he accepts into use. Functional education is one of the slowest processes known and frequently health workers grow impatient. They then turn to peddling out service or resort to coercion to accomplish the results they are seeking.

If we were to analyze the factors which are important to health, almost at once we would note the environment as one of the most important. The child at school, as well as the child at home, must depend upon the adults in his home and community to provide the type of environment in which he can best grow. The child has very little influence over his mode and place of living, so in spite of what the school teaches him about environment, he

must still depend upon those older than himself to provide the material needs of his life. The school can first provide within the school the best physical environment possible and then teach both children and adults of the community what constitutes a satisfactory environment and how improvements can be made. The school has no coercive rights to force changes in modes of living. Palliative measures will not, in the long run, pay such dividends as will the slower processes of real education.

Another factor in the child's life which most of us concede as of vital importance to him, and upon which most of our present health education has been based, is the group of so-called health habits. Habitual health practices tend to develop in proportion to the adequacy of the equipment provided, sympathetic encouragement for, and the amount of insistence upon regular performance of a given task. Again, the adult is responsible for these and, at best, the school can only assume its responsibility for seeing that those health practices which need to be followed by the child while in school are followed, and to give a limited amount of information to the child about health behavior. To overstress health teaching when health promoting practices are impossible, more frequently than not, re-

* Read at a Joint Session of the American School Health Association and the Public Health Nursing Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 25, 1938.

sults in a negative reaction to the whole régime. In the course of a 9th grade boys' hygiene class, one lad made a remark that his mother would like to feed the family correctly. He said that she read menus and then realized she could not afford the foods mentioned. The boy was frankly discouraged.

A third factor brings us to the area of much confusion in thinking and, therefore, to much disagreement in policy. This consists of the prevention and correction of defects, infections, and sources of strain. Certainly, in the face of the present national dilemma on medical care, few would dare to express an opinion as to what the school will be asked to assume in its future health program. Personally I hope that the schools may be asked to keep their activities within the original bounds of education. I am not suggesting that the schools take a side in the controversy but as resources and new avenues for additional health care are developed through other community agencies, the schools shall teach people how to make use of these facilities.

Health education is, at best, only partially successful unless the end result of the health program is a satisfactory emotional attitude of the individual toward his limitations as well as toward the potential abilities placed upon him by heredity and environment. This may be termed mental hygiene if you wish. The school should recognize that there is a great problem in an individual's adjustment to an unpredictable social environment. School people are too prone to think that wonders can be accomplished in the 6 hours of the school day. I am not so optimistic. What happens during the other 18 hours of the day may enhance or undo the work of the school. This depends upon the degree of functional education the school has been able to accomplish not only with the child but with the adults who manage the child's world.

THE CONTRIBUTION OF THE SCHOOL NURSE TO THE SCHOOL HEALTH PROGRAM

Usually about the only full-time health worker found in schools is the school nurse. Her 3 years of basic hospital training is apt to have made her a follower instead of a leader, hence her advanced preparation must offset this psychological attitude. Upon entering school work many nurses feel inferior to the teachers in spite of the nurses' superior knowledge as to what makes for health. The nurse has already, or soon learns, the technics of measurements which are used in determining some of the aspects of health. These include sight and hearing tests, weighing and measuring, and the technics of recording her own or the physician's findings of the deviations from normal body structure. She also has learned how to do a good job of taking care of the children and frequently finds it easier to take care of the child herself than to teach someone else to do it. Too frequently she is unwilling to let neglect exact its just toll. She fears the danger to life. However, one might well ask what happens to the child during the other 18 hours of the day outside of the school, unless the child or his parent knows what to do. Experience under guidance is an excellent teacher.

A school health program based on health education needs personnel prepared to see in their work many educational possibilities. A big problem of a school system, which desires to base its health program on education, is to find a nurse prepared not only in the routine work as given above but who can also measure up to the following standards:

1. The nurse shall be able to evaluate the educational assets and weaknesses of each of the routine procedures which she is required to do. For instance, she shall see the educational meaning when she weighs a group

of children, or the educational handicap of the deaf child.

2. The nurse shall know what community resources are available which, if put to proper use, may make the life of those with whom she deals more worth while.

3. The nurse shall know how to compile her records in such a way that the community shall know the health needs and status of the school population. She shall know how to teach key people about what she has found and how this knowledge may be used most wisely.

4. The nurse shall know when to shed responsibility on to the shoulders of its rightful owner. She is not a prop but a guide to a more self-sufficient life.

5. The nurse shall know how to make each contact with a child, a teacher, or a parent of real value, in that the individual feels better able to cope with the situation should it again occur.

6. The nurse shall evaluate all she does as to its real worth, eliminating all "busy work" done to fill in time and tending to pad reports, and shall create, when necessary, new and better ways of doing her work.

In conclusion, a nurse with certain routine duties to perform will produce findings which should be of real value to somebody else in the school system. The findings themselves are valueless until someone uses them. The nurse is responsible for finding that which is good or bad as it relates to health, but the changes necessary for betterment are usually the responsibility of somebody else. The nurse is a health educator only when she can get others to assume their responsibilities.

Balancing Our Health Budget

"In connection with balancing the budget, Mr. Chairman, I hope that this Congress will give more attention to balancing our health budget. It is cheaper to keep a woman from dying in childbirth than to take care of the orphans in an orphan asylum or to give aid to the dependent children. It is cheaper to aid in building tuberculosis sanatoriums than it is to pay for the death from tuberculosis and the widows and children who are left. The State

Health Officer of Tennessee estimates that it costs on the average of \$150 to bury a person in Tennessee, and on that basis it is costing that state more to bury people dying from tuberculosis than for its entire health program, including tuberculosis and all the other diseases."—Testimony before the Subcommittee of the Committee on Education and Labor of the United States Senate, by Dr. Thomas Parran, Surgeon General, U.S.P.H.S.

Industry's Challenge to the Nurse^{*}

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TO improve and preserve the health of the industrial worker to the extent that more complete happiness and greater individual productive capacity shall be possible—this is the challenge of industry to the nurse.

Because we are workers in the health industry, we first view the humanitarian aspect of this challenge.

There are approximately 40,000,000 industrial workers in the United States to be kept in a state of health to make possible a maintenance of living standards which will be a contribution to American society.¹ The nurse is in a strategic position to aid in the improvement and preservation of high health standards of all fellow employees and their families. How can she help?

I. By educational programs on health and safety, in order to prevent disease and injury. This program would include: mass meetings on health problems, and work with safety engineer and committees.

Literature and posters on health questions distributed to individuals, posted on bulletin boards, available in reading rooms and hospital waiting room, enclosed in pay envelopes.

Instruction and demonstrations in homes at every opportunity on questions of health, sanitation, hygiene.

II. By contacts in the homes she has unlimited opportunity to give helpful advice, establish good will and aid in adjusting social problems.

1. She may be responsible for getting the doctor on a personal case before it is too late.

2. She will assist in securing aid, if needed, by reference to proper agencies, and see that the employee understands functions of community agencies.

3. The nurse's opinion may be valued highly by employees; for to them she is more than a professional person, she is, by her closer association with them, more of a friend. They trust her judgment and may rely more on her advice than any other, therefore, she must be worthy.

III. The cooperation of industrial medical units with city and state health department programs and their interpretation to the management will be an aid to improvement of health standards. In this, as in all activities, the nurse acts as an aid to the physician and must keep herself informed. Where there is no full-time physician, it may be necessary for her to interpret these programs.

IV. By helping to make the plant a more healthful place in which to work.

By plant sanitation inspections or by assisting in them and recommendations to improve sanitation (lighting, ventilation, dust control, cleanliness and elimination of all unsanitary conditions), the nurse will help to make the environment in which workers spend at least 8 hours a day, a contributing factor to better health and, consequently, better workmanship.

V. By instituting recreational programs where there are none, not only the physical but the mental health is given a boost. Clean recreation at the plant develops interest in clean recreation outside, and so keeps minds and bodies on that higher level.

VI. Probably the most important factor in building health is to know the actual physical state of the people in your plant. This is possible only by physical examination pre-employment, and at least annually thereafter, supplemented by follow-up work on recommendations made by the doctor, and by constant observation and complete records kept

^{*} Read at a Joint Session of the Industrial Hygiene and Public Health Nursing Sections of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

by the nurse on all corrections and additional defects discovered between examining periods.

The nurse must be able to show a worker the advantages and the returns on his investment in good health. She must, among other things, be a good saleswoman. To do this she must be a shining example and a firm believer in the thing she is selling. She must also be patient, encouraging, and persevering when trying to accomplish 100 per cent correction of physical defects.

VII. The nurse may be the go-between in rehabilitation for injured or ill workmen. With the plant physician, the personnel director, and the foreman, she aids in properly placing returned workers, both to the satisfaction of employee and employer.

ECONOMIC CONSIDERATION

The nurse is ever alert to the interest of her patients. The industrial nurse is a specialist in the field of nursing. She has not only a duty to the employee from a humanitarian standpoint, but the challenge of industry has an economic consideration.

Much of the absenteeism in industry is preventable. Knowing this is a challenge to industrial doctors and nurses. We have tangible objectives toward which our efforts must be directed.

Absenteeism must be reduced. It is expensive and inconvenient to both employer and employee.

Injury—The nurse can decrease absence due to injury; first, by putting forth her best effort in teaching, interpreting, and selling safety. Thus prevention in injury is a big factor. By coöperation with management, personnel director, and safety director, she can do much to aid in prevention.

Taking minor accident histories, recommending corrections in plant conditions, if at fault, will prevent further accidents. A good nurse may have a greater influence on the worker while treating an injury, by advising and teaching safety at that particular time, than anyone in the entire organization.

Another phase of prevention is of course the proper technical knowledge

used in treatment of injuries to prevent infection and speed recovery. Enough cannot be said here on this important subject. Every nurse recognizes the importance of proper first aid treatment under standing orders of the plant physician. Thus the severity rate can be decreased.

The nurse must be able to show the management the importance of immediate treatment of all injuries, regardless of severity, by either the *doctor or nurse* and not by fellow employees or outsiders. Disastrous results will accrue if such practices are permitted, whereas if proper immediate treatment is insisted upon, the company will benefit in decreased compensation and absenteeism, and the employee need not suffer unnecessary pain, permanent disability and loss of time.

Occupational Disease—Absence due to occupational disease is a problem every nurse must face. Here as before her first duty is prevention.

In the *Industrial Nursing News Letter*, August, 1938, the following statement was made: "Every nurse, in addition to caring for sick and injured workers, has the golden opportunity of observing conditions in the making which affect their health. If management is not informed of the hazards, whose fault is it?"²

There is a challenge!

By plant inspections the alert nurse will recognize, investigate, and recommend correction of many hazards before they have had the time to affect health. We cannot always hope to recognize such hazards, so we must be good observers and case finders. Early case finding and reporting to the plant doctor is a step toward early recovery and prevention of additional cases. This responsibility lies with the nurse.

The kinds of occupational disease reported vary in different states, due to type of industry prevalent in that area.

Also in some states certain occupational diseases are not compensable, therefore, it is impossible to make a definite statement as to that class of diseases which is most frequent. However, we know that occupational disease accounts for $\frac{1}{2}$ per cent to 2 per cent of all disabilities from industrial causes. Those ranking among the highest in a study of the States of New York and Ohio are dermatitis, tenosynovitis, and lead poisoning.³

Illness—According to a limited study made by the American College of Surgeons, in which 116 companies from various parts of the United States, employing 352,591 workers, reported in 1936 that the average worker loses 15 times as much time from non-industrial injuries and illnesses as he does from industrial injuries. Therefore we are compelled to direct every effort toward controlling disease due to non-industrial causes.

The relative frequency of diseases among 105,072 male industrial employees, in a study by the U. S. Public Health Service, 1921-1927, shows respiratory diseases 41.8 per cent. Next in rank are digestive diseases, external causes, circulatory and genitourinary, rheumatism, nervous system, skin, organs of locomotion, and epidemic and endemic diseases.⁴

In considering nursing activity to control this absenteeism, we again say prevention comes first.

Primarily maintenance of high health standards and immunization are the two leading factors in preventing disease.

Industry may not sponsor immunization programs, but by coöperating with health departments, an industrial nurse may by advice and encouragement be influential in promoting the individual immunizations needed.

Plant sanitation and teaching of health habits will aid in control of contagion and infection. This should

affect that respiratory disease rate.

Early case finding, reference to a physician, and isolation of suspected contagions should speed recovery of any case and prevent transmission of infectious diseases. Industry expects the nurse working in the plant to be capable of observing and properly disposing of cases, to minimize transmission of infections and loss of time.

Supervision of care in the home of either injury or illness cuts absenteeism. Improvement in medical science and hospital care has reduced hospitalization period one-half in the last two decades.⁵ Why then cannot scientific care in the home reduce the period of absenteeism? We know that it can.

DEBITS AND CREDITS

The doctor and nurse are those chiefly responsible for the state of employees' health. Plant sanitation, home hygiene, correction of physical defects, proper recreation, proper placement in consideration of physical ability—all these are their activities toward the goal of better health and greater production.

The benefits accruing from these activities are sometimes intangibles that cannot accurately be converted into material values. We believe that they are desirable dividends and worthy of their cost. We must prove them to be so.

According to the American College of Surgeons the smaller the plant the greater per capita medical and compensation costs (60 per cent greater in small plant). Small plants are usually lacking in proper health preservation measures. There is no regular physician but usually one on call only.⁶ The nurse in this type of plant is responsible for cutting cost. She can institute, with the advice of the physician on call, a health program with preservation measures, just as any public health nurse can do. She can in-

interpret plant sanitation to employees. If there is no doctor or sanitation engineer, she may make minor plant inspections, sell management on physical examinations, teach safety and health, do follow-up work on recommendations on doctor's examination, make home visits supervising care and teaching health and home hygiene, and keep informed upon and practice proper care of injury and illness, keep records for management showing actual dividends in health and decreased absenteeism, if not in actual dollars and cents, making them realize that it is cheaper to pay for preventive measures through organized and efficient medical and safety service, than for emergency repair service and compensation.

PREPARATION AND QUALIFICATIONS

In conclusion, the natural questions are "Are we prepared?" and "What qualifications must we have to consider meeting the challenge of industry?"

As stated by Ernest Augustus, Safety Director, The Mead Corporation, Chillicothe, Ohio, some of the necessary personality qualifications of an industrial nurse are:

Courtesy and a sympathetic attitude toward others; being neat, clean, and attractive in her personal appearance and dress; having tact and diplomacy; sincerity of purpose; good health; dependability; far-sighted vision, and ability to plan ahead; sound judgment; initiative and originality; industriousness; loyalty; supervisory ability and willingness to cooperate with others; a sense of absolute fairness in all things; coolness in times of emergency; a good common sense knowledge of human nature and how to handle people;

a pleasant voice and a kindly smile for all alike; the rare ability to be a good listener; adequate technical knowledge and ability in her profession; impeccable moral habits; and a sincere personal interest in other people.⁷

PROFESSIONAL QUALIFICATIONS AND PREPARATION

First she should be a registered nurse, with at least a high school education; be an interested member of the Alumna, State, and National Nursing organizations. If unsupervised by a public health nurse, she should have had some postgraduate work in public health, specializing in industry. She should have had some supervised experience in community public health nursing. She must know her community health agencies, and work with them. She must attend meetings of all professional organizations.

A nurse with these qualifications can hope to justify the expenditure of time and money, the trust and confidence placed in her when she takes a position and accepts the challenge of industry.

REFERENCES

1. Social Security Board. August, 1938, statistics.
2. Editorial. "Getting Ahead of Trouble." *Indust. Nurs.*, Aug., 1938, p. 1.
3. Newquist, M. N. Incidents of Occupational Disease. *Medical Service in Industry & Workmen's Compensation Laws*, American College of Surgeons, 1938, p. 31.
4. U. S. Public Health Service.
5. Source: American College of Surgeons, 1938. *Medical Service in Industry & Workmen's Compensation Laws. Length of Hospitalization*, p. 33.
6. Costs by Size of Plant. *Medical Service in Industry & Workmen's Compensation Laws*, American College of Surgeons, 1938, p. 35.
7. Augustus, Ernest. How Can the Industrial Nurse Help Maintain Employee-Interest in the Safety Program. Delivered before the Industrial Nursing Section, National Safety Congress, 1937. *Pub. Health Nurs.*, 31, 1:7, 1938.

Newer Concepts and Procedures of Maternal Care*

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GOOD maternal care demands that the health and life of the expectant mother be preserved and that a child shall be born alive and capable of continued normal extrauterine existence.

That such care is not generally available to the mothers and babies of this country is a fact which is accepted by all who have studied the situation. The important thing now is to determine an intelligent course of action within the means at our disposal and embodying methods which have already proved their value, but one that looks toward continuously improved facilities in communities not properly equipped at present.

Good maternal care consists of good prenatal care *plus* skilled medical and nursing care during delivery and the puerperium, and has social and economic aspects as well as those that are strictly medical.

The value of prenatal care as an essential element in good maternal care has been increasingly appreciated since 1858 when the first prenatal clinic was established by accident at the Dublin Maternity Hospital because expectant mothers were required to report early in pregnancy in order to insure them-

selves a bed in the hospital for confinement.¹ It was at this time that first general use was made of the discovery some years previously that the appearance of albumin in the urine was associated with the toxemias. Because these women with toxemias were treated early, there were fewer deaths from eclampsia.

Since that time the practice of prenatal care has been influenced by innumerable advances in every field of medicine, but here as everywhere there has been a distressing lag between discovery and application. For instance, the significance of blood pressure determinations in pregnancy, though recognized as early as 1894, is still apparently not appreciated by many physicians who care for pregnant women.

According to recent studies there is still only a small percentage of expectant mothers who receive any kind of prenatal care,^{2, 3} and an even smaller percentage who receive what can be considered good prenatal care.⁴

Death rates from toxemias of pregnancy decreased 37 per cent between the years 1930 and 1936 in this country. The increased practice of prenatal care is credited for this. But deaths from this cause still constitute 23 per cent of all maternal deaths, second only to sepsis.

Undoubtedly the lives that have been saved by good prenatal care thus far are only an indication of what can be

* Read at a Joint Session of the Child Hygiene and Public Health Nursing Sections of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

expected by a much more widespread application of a higher quality of care. In view of recent observations, there is good reason to believe that not only deaths from eclampsia but also a considerable share of those due to other causes could be prevented by much better prenatal care than has been generally available in the past, and by reduction in the number of abortions.

The direct bearing of nutritional status, of focal infection, of glandular imbalances, of such diseases as tuberculosis, heart disease, and nephritis, on puerperal mortality, have been subjects of much study in recent years and must be taken into consideration in any appraisal of the value of prenatal care.

The importance of the nutritional status of the pregnant woman is receiving more recognition than ever before. There is no denying the fact that a woman who is in good nutritional condition is better able to withstand the demands of pregnancy and labor. Some very significant observations on the effect of supplementing the diets during pregnancy have been reported recently, particularly in Great Britain. In 1934 in the Rhondda Urban District in Wales, the puerperal death rate, despite the *usual* prenatal care, had failed to decrease and, as an experiment, supplemental food was provided in addition to the usual care given in the prenatal clinics. I quote from the *Report of the British Health Services*⁵:

The puerperal death rate among the 10,384 expectant mothers who received extra nutrition from January 1, 1935, to July 30, 1937, was 1.64 per 1,000 total births, whereas among the 18,854 other cases in the same area the puerperal death rate was 6.15. The stillbirth and neonatal death rate among the cases assisted in 1937 was nearly 50 per cent less than that among the other cases in the same area. Other factors such as failure to attend antenatal clinics may explain a part, but certainly not the whole, of this difference.

The results of these studies are worthy of serious consideration. As a

result, in England, Wales, and Scotland, the majority of maternity and child welfare authorities are now supplying milk to expectant and nursing mothers attending clinics.

Recently attention has been focused on the etiological relationship of low protein diets to the toxemias of pregnancy.^{6, 7} This factor is of special importance in certain sections of the southern parts of the United States. The relationship of salt intake to the toxemias is also being restudied.⁸ Likewise the effect of vitamin and mineral intake on the health of the expectant mother and her baby are being given more consideration of late, as is the prevention of anemias of pregnancy by proper regulation of the diet.

Focal infection during pregnancy is receiving more attention because in the opinion of a number of observers there is a relationship between focal infection and sepsis, kidney infections, toxemias, and abortion.^{9, 10, 11}

An appraisal of the pregnant woman's endocrine system is necessary to safeguard the health of the mother and the baby. Thyroid dyscrasia is a recognized factor in habitual abortions.⁹

A serological test for the presence of syphilis early in pregnancy is now a routine procedure in good prenatal care.

Tuberculosis, heart disease, and nephritis all contribute substantially to the numbers of puerperal deaths, and a reduction of these deaths demands early diagnosis and intelligent management—a responsibility which must be assumed by the physician and nurse as part of prenatal care.

In order to make sure that the best type of prenatal care is given in clinics that are being established, careful supervision of the medical services must be provided by physicians who have specialized in obstetrics. It is encouraging to note that, of the 38 states which have set up prenatal clinics as a part of the maternal and child health

program under the Social Security Act, 25 have employed obstetricians either full-time or part-time on their staffs to give supervisory and consultation services in the maternity program. A number of states have established technical committees composed of practising obstetricians and pediatricians to help by formulating standards of maternity care and care of new-born infants.

Many of the states that are developing nutrition programs are providing nutrition services at the prenatal clinics; likewise, a few states are providing dental services at the clinics, and one state reports that tuberculin tests are being done routinely in the prenatal clinics. Wassermann tests are being done routinely in the prenatal clinics in 33 states.

In addition to the best possible type of medical care, we must recognize that in the areas where the best results have been obtained, as shown by a marked reduction in puerperal deaths, the public health nursing service has also been good. It is the public health nurse who is largely responsible for getting the women under medical care in the first place, seeing to it through home visits that they understand how to carry out the treatment ordered by the doctor, who is on the alert for danger symptoms, who sees that the patients remain under medical care. Without these services the mere setting up of a prenatal clinic is practically useless. Efficient public health nursing service makes the prenatal clinic work and get results.

CARE AT TIME OF DELIVERY

About half of the puerperal deaths are due to causes incident to labor and delivery. The provision for safe care at delivery is essential to the demands of good maternal care and whether the delivery occurs in the hospital or the home, skilled medical and nursing care must be provided. In 1936, approximately half of the two million live

births occurred in rural areas and 86 per cent of these births were reported as occurring in the home. In addition, 29 per cent of the live births in urban areas occurred in homes, making a total of a million and a quarter live births which occurred in homes. The problem of providing good medical and nursing care for these mothers and babies when the delivery takes place in the home offers special difficulties which are now more than ever before calling for solution.

A planned home delivery in competent hands may be safe for both mother and baby. By "planned" I mean that the patient has been under prenatal supervision and is known not to have any complications which contraindicate a home delivery, and preparations for the delivery have been made with the aid of a nurse. By "competent hands" I mean a conscientious physician who knows when he needs the consultation service of an obstetrician or pediatrician and where to obtain it, and a nurse who is skilled in obstetric nursing and nursing care of the new-born.

It is recognized for all primiparae, and in certain complications and emergencies, delivery care in a well staffed and equipped hospital is essential and every effort should be made to arrange it before labor begins. Wherever home deliveries are done, access to the facilities of a well equipped and well staffed hospital with readily available consultants within reasonable distance is essential if these lives are to be saved.

In 83 counties in 27 states, delivery nursing service for patients delivered in their homes by physicians has been organized. According to preliminary progress reports, there has been a substantial increase in the number of services during the past year. Methods are being worked out and it is hoped in time such service will become available in a much larger area.

This discussion has dealt largely with

the problem of care of the woman to be delivered in the home because the need to improve this care is so great and so pressing. Ideally, however, care in a well staffed, well equipped hospital should be available to all women for delivery, but obviously it will be some time before such facilities can be provided. Moreover, unfortunately, there exist today altogether too many hospitals or maternity homes where skilled consultation service is not made available, where operative procedures are undertaken without previous obstetric consultation, where equipment for good obstetric care is inadequate or lacking, where isolation facilities for the septic woman or infected infant are not provided, where highly skilled nursing care for mother and infant are not available. If the deliveries are to be increased either in existing hospitals or in new ones, as indeed seems desirable, it is imperative that responsible public authorities establish and maintain, with the advice of qualified specialists in the fields of obstetrics and pediatrics, standards of hospital care that will insure a high degree of safety for mother and infant.

The opportunity to raise standards of care either for hospital or home delivery lies increasingly in the hands of state health department officials who are responsible for maternal and child health programs.

The matter of providing obstetric and pediatric consultation services for general practitioners is receiving increasingly greater attention by the state health departments. In one state, such services are available on a state-wide basis. Though most of the projects now in force cover only a limited territory, a variety of methods are being explored with a view to determining the most practical for use under different conditions. Eighteen states employ obstetricians or pediatricians on a full-time salary basis for this purpose; in 22

states consultants are employed on a part-time basis, and in 4 states specialists may be called for consultation from an approved list by general practitioners and payment made on a case basis.

Just as we have to devise ways in which to deal with the problem of home delivery intelligently, we must face the problem of the untrained midwife and deal energetically and intelligently with it. In 1936, nearly a quarter of a million deliveries were attended by midwives or other non-professional persons. In 1938, 34 states report approximately 35,000 midwives practising. Twenty-eight state health departments now have assumed responsibility for supervising their midwives, and approximately 23,000 are so supervised. Some states are requiring that all midwives' patients attend prenatal clinics.

In Tift County, Ga., the local health department in coöperation with the State Division of Child Hygiene has set up a program which illustrates many of the features which I have mentioned. In this county, both the infant and maternal mortality rates have been high, and 42 per cent of the births have been attended by midwives. Prenatal and postnatal clinics, directed by an obstetrician on the health department staff, have been established at strategic points to give care to all patients of midwives and to patients of physicians if they desire it. A complete program of midwife control, instruction, and supervision is being developed. The obstetrician is available for delivery of all midwife cases deviating from normal and is also available for consultation to physicians on request. Home delivery nursing service is available to physicians conducting home deliveries. Services of local registered nurses at the time of delivery are utilized to supplement the health department nursing staff. Sterile packs are provided for the use of physicians in home deliveries and certain sterile sup-

plies are provided for the use of midwives. Patients requiring hospital delivery are cared for at hospitals through funds made available for this purpose by the county. Programs such as this are pointing the way for fulfillment of the demands for good maternal care for the mothers and babies of the United States.

No discussion of the subject of maternal care is complete without mention of the problem of abortion which is responsible for 20 per cent of puerperal deaths and gives indication of being on the increase. Nothing less than a concerted drive by health and welfare authorities, the medical profession, and the public working together by every means at their disposal will effect any reduction in the deaths due to this cause.

REFERENCES

1. Taussig, Fred J. The Story of Prenatal Care. *Am. J. Obst. & Gynec.*, 34, 5:731-739 (Nov.), 1937.

2. Colvin, E. D. Maternal Mortality Study in Georgia During Year 1935. *South. M. J.*, 30, 3 (Mar.), 1937.

3. Williams, Philip F. Maternal Mortality in Philadelphia, 1931-1933. *Report to Philadelphia County Medical Society*, 1934.

4. Maternal Care in Michigan. Preliminary Reports, National Health Survey, Sickness and Medical Care Series. *Bull. No. 8*, p. 19. Division of Public Health Methods, National Institute of Health, The U. S. Public Health Service, Washington, D. C., 1938.

5. Report on the British Health Services. A Survey of the existing health services in Great Britain with proposals for future development, Dec., 1937. (P.E.P.), London, 1938, Chapter IV, p. 99.

6. Barker, M. Herbert. Blood Chemistry Observations in Protein Deficient and Toxic Pregnancies. *Am. J. Obst. & Gynec.*, 35, 6:949-953 (June), 1938.

7. Strauss, M. B. Relationship of Nutritional Deficiency, Hypo-Proteinemia and Elevated Venous Pressure to Water Retention in Pregnancy. *Am. J. M. Sc.*, 190:811 (Dec.), 1935.

8. De Snoo, Prof. K. The Prevention of Eclampsia. *Am. J. Obst. & Gynec.*, 34, 6:911 (Dec.), 1937.

9. Miller, Hilliard E., M.D., and Thomas, E. Perry, M.D. Prenatal Care. *Davis' Gynecology and Obstetrics*, Vol. I, Chapter V, p. 43.

9. *Ibid.*, p. 55.

10. Colebrook, L. Prevention of Puerperal Sepsis. *J. Obst. & Gynec., Brit. Emp.*, 43:691 (Aug.), 1936.

11. Bland, P. B. First A. Relationship of Stomatologic Clinic to Maternity Dispensary. *M. Rec.*, 141:281 (Mar. 20), 1935.

Epidemiology of Syphilis in New York City*

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NO phase of syphilis control is of greater interest to the health officer than its epidemic manifestations. Epidemiology has been defined as "the study of disease as a mass phenomenon."¹ The concept of epidemiology in relation to syphilis has been broadened in recent years to include a consideration of the factors concerned with the transmission and means of prevention of spread of this disease in the community.

It has long been recognized that syphilis spreads in epidemic form. To quote Parran,² "Syphilis is an epidemic disease. It is kept alive, and spreads in the population by a series of small epidemics." One of the earliest accounts of an epidemic of syphilis in this country is that related by Governor John Winthrop³ who described an outbreak of syphilis which occurred in Boston in 1646:

"1646: There fell out also a loathesome disease at Boston which raised a scandal upon the town and country, though without just cause. One of the town () having gone cooper in a ship into (), at his return, his wife was infected with lues venerea which appeared thus: being delivered of a child, and

nothing then appearing, but the midwife, a skillful woman, finding her body as sound as any other, after her delivery, she had a sore breast, whereupon divers neighbors resorting to her, some of them drew her breast, and others suffered their children to draw her, and others let her child suck them (no such disease being suspected by any), by occasion whereof about 16 persons, men, women and children, were infected, whereby it came at length to be discovered by such in the town as had skill in physic and surgery, but there was not any in the Country who had been practiced in that cure. But (see the good providence of God) at that very season there came by accident a young surgeon out of the West Indies, who had had experience of the right way of the cure of that disease. He took them in hand, and through the Lord's blessing recovered them all () in a short time. And it was observed that although many did eat and drink and lodge in bed with those who were infected and had sores, etc., yet none took it of them, but by copulation or sucking. It was very doubtful how this disease came at first. The magistrates examined the husband and wife, but could find no dishonesty in either, nor any probable occasion how they could take it by any other, (and the husband was found to be free of it.) So it was concluded by some that the woman was infected by the mixture of so many spirits of men and women as drew her breast (for thence it began.) But this is a question to be decided by physicians."

A little more than a century later (1759) Voltaire in his immortal *Candide*, relates the story of Pangloss's infection. With astonishing prescience the droll fellow traces most

* Read before the Epidemiology Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 25, 1938.

accurately the source of his own disease through nine or ten individuals, back to one of the companions of Christopher Columbus.

Contributions to the public health literature on the practical epidemiology of syphilis are all of comparatively recent date. The venereal disease control program has given full recognition to the great importance of epidemiologic work in the control of the disease. Munson^{4, 5} reported a series of localized outbreaks of syphilis in rural areas in upstate New York and demonstrated the practicability of epidemiologic investigation, terming his method "sole-leather epidemiology."

Smith and Brumfield^{6, 7} described excellent examples of investigation of syphilis patients in a southern rural community. They emphasized the paramount rôle of the physician in such investigations; because of the intimate relationships between physician and patient during the course of routine history taking and physical examination, an unequalled opportunity is provided for the establishment of complete confidence in the doctor.

It is possible that the above reports may have given rise to the conclusion that it is impossible to track down similar outbreaks in large cities, because of the obvious differences in population and locale. Experience in New York City as shown here and elsewhere⁸ indicates that with careful and intensive application of direct epidemiological procedures, this type of work is also possible in a metropolis. Moreover, it has been shown conclusively⁹ that epidemiological methods of investigation are applicable to syphilis patients in private as well as clinic practice.

Ingraham¹⁰ outlines the technic of approaching the patient for information as to source and contacts and stresses the superiority of the persuasive method of approach over that of coercion.

Similarly, suspected contacts submit to examination, and to treatment when infected, more readily when persuasion has been employed than where compulsion has been practised.

Kulcher and Ninnis¹¹ have described a coördinated police and social service system of case investigation at the syphilis clinic of Stanford University School of Medicine. Under this system, sources of infection, contacts and patients lapsing treatment, who have been reported to the San Francisco Department of Public Health, are investigated jointly by an un-uniformed police inspector and a social service worker. Statistics are given showing the effectiveness of this method. The authors claim that the combined method of police and social service investigation is more effective than either one when used alone.

SYPHILIS IN NEW YORK CITY

Morbidity reports do not present a true picture of the syphilis problem in New York City. However, such information as is available is of interest to the epidemiologist because it indicates prevalence and distribution of this disease in the community.

Syphilis in New York City occurs endemically with a tendency to spread in localized outbreaks. It has been conservatively estimated from a census study^{12, 13} that the prevalence rate of syphilis in New York City is about 5 per cent of the total population, with 58.5 per cent among men and 41.5 per cent among women. It is worthy of note that the number of early cases, as shown by this study constituted about 17 per cent of the total number of cases reported under treatment.

A study of reported cases of syphilis by age distribution¹⁴ showed that 52 per cent of the total number occurred in the age group 18-35, with the highest peak (20.22 per cent) in the age group 24-29.

Available reports indicate that an average of 6.5 per cent of pregnant women¹⁵ in the United States are infected with syphilis in one form or another, and that about 2 per cent of the child population are victims of congenital syphilis.¹⁶ It is felt that the same rates probably prevail in New York City.

PROCEDURES IN CASE INVESTIGATION

Health officers agree that syphilis can be eradicated by organized efforts at discovering and treating infected individuals. The first step in any effective case finding machinery is the prompt and complete reporting of every diagnosed case of syphilis. Reports of laboratory examinations for syphilis are no longer accepted as case reports by the New York City Department of Health.

The Sanitary Code requires physicians, hospitals, and clinics to report to the Department of Health the full name, or initials, and address, sex, age, and occupation of every person infected with syphilis. Provision is made on the report form for the inclusion of information regarding the duration of the disease and the identity of the source of infection. U. S. Public Health Service penalty envelopes are provided for this purpose by the Bureau of Social Hygiene and require no postage.

Practical experience in New York City has shown that the application of direct epidemiological procedures to cases of early syphilis is the most effective means of discovering new foci of infection. Each infected person uncovered as a result of proper investigation and brought under treatment is a check on the further spread of the disease.

Each case of early syphilis is personally interviewed by an epidemiologist or the social worker, for the purpose of ascertaining primarily the identity of the person from whom he

may have contracted the disease, and the identity of individuals to whom he may have transmitted his infection. An attempt is first made to secure the examination of sexual partners, and the immediate family and household contacts, through the effort of the patient himself. More often, however, visits are made by the investigator to induce the suspected source and contacts to submit to examination and to treatment, if found infected. They are advised to go to a private physician or referred to a hospital or the nearest health department clinic, if unable to pay for private medical services. Household or family contacts are frequently examined at home, if they are unable to report to the clinic at stated hours.

If the patient fears to have the nature of his disease revealed to his family, he will usually coöperate in securing the examination of the family contacts on some pretext, such as life insurance purposes, or a periodic check-up of the general health.

If the person sought is not at home, a discreetly worded note in a plain sealed envelope, properly addressed, is left on the premises urging the respective individual to report to the office of the epidemiologist at specified hours for an interview. If there is no response to this request, a strongly worded special delivery or registered letter is sent.

Usually by persuasive means, it has been possible to gain the confidence and coöperation of all concerned and to induce the suspected source of infection and contacts to submit to examination and treatment, if needed. In every instance, the patient and his contacts are assured that their identities will not be revealed in the investigation, and that the information given by them will be held strictly confidential.

The same procedures apply to all cases of early or infectious syphilis in

the course of epidemiological investigation, whether referred by private physicians, health department clinics, non-departmental clinics and hospitals, or out-of-town official agencies. In the follow-up of patients referred by private physicians, workers invariably represent themselves as coming from the physician. One of the most important functions of the epidemiologists of the Bureau of Social Hygiene is to visit the physician in his office, to establish cordial relations, acquaint him with the program and services rendered him by the Department of Health, act in a consultative capacity, and, in general, advise and guide him on venereal disease problems. Frequently the epidemiologist will interview the patient in the physician's office, being introduced sometimes as a representative of the Department of Health, and more often as an interested professional colleague.

The staff engaged in these activities consists of 5 medical epidemiologists and 2 male investigators, under the supervision of an assistant director in charge of epidemiology, and 8 public health nurses, acting as nurse epidemiologists, 2 medical social workers, and 35 investigators and field workers, functioning under an assistant director in charge of nursing and social work.

Where infection of a person in New York City is stated to have occurred out-of-town, information regarding the suspected source of infection is reported to the health authorities of the city or town where infection is alleged to have taken place. In cases where it is believed that prostitution is carried on, such information is referred to the police authorities.

An important case finding procedure in New York City is carried on in relation to vagrants and sex offenders. All sex offenders, including those arrested on charges of prostitution, are required to be examined for venereal disease under the New York State

Public Health Law. This offers an excellent opportunity for the discovery of cases of syphilis. As one would expect, the incidence of syphilis in this group is very high.

During the year 1936, 3,804 women were examined in the health department diagnostic clinic at the House of Detention for Women. Twenty-two per cent were found to have syphilis, 23 per cent were found to have gonorrhea, and 13 per cent were found to have both syphilis and gonorrhea. Of the total number examined, 58 per cent were found to have one or both of these diseases.

In 1937, 4,254 women were examined in the health department clinic at the House of Detention—23 per cent were found to have syphilis, 35 per cent gonorrhea, and 10 per cent both syphilis and gonorrhea. Of the total number, 68 per cent were found to have one or both of these diseases. Under the Public Health Law cited above all persons arrested and arraigned on charges of vagrancy and prostitution are reported to the Department of Health and examined for evidence of venereal disease. Such persons may be detained until the results of these examinations are known. Persons with infectious syphilis are removed by the Department of Health to a quarantine hospital and held there until rendered non-infectious. In every instance the infected individual is interviewed by a nurse from the department for purposes of instruction and to secure information on sources of infection and contacts.

Two recently enacted laws in New York State are worthy of note in connection with the epidemiology of syphilis. The prenatal examination law provides that every physician attending a pregnant woman during gestation shall take or cause to be taken a specimen of her blood at the time of first examination, and submit it to an approved laboratory for a standard sero-

logical test for syphilis. The premarital examination law requires that prospective brides and bridegrooms must each obtain a medical certificate, based on a physical examination and a standard serological blood test, stating that they are free from syphilis, or, if

infected, not in a stage which may become communicable, before they are granted a marriage license. The examination and blood test must be made within 20 days before receiving such license. The enactment of these two new progressive public health laws,

FIGURE I

CITY OF NEW YORK - DEPARTMENT OF HEALTH - BUREAU OF SOCIAL HYGIENE
EPIDEMIOLOGICAL INVESTIGATION FORM

PATIENT'S NAME _____		SEX _____	COLOR _____	MARITAL STATUS _____	Case No. _____	
Address _____		AGE M. F. W. C. S. H. W. D. _____				
Referred by: _____		Occupation and Place of Employment _____				
Date _____		Reason _____				
First Symptom and Date of Onset: _____				Symptoms in Sequence and Dates _____		

PHYSICAL EXAMINATION: DATE _____		LABORATORY TESTS		
Type and Location of Lesions	Type	Date	Result	
_____	Darkfield	_____	_____	
_____	Wassermann	_____	_____	
_____	Smear	_____	_____	
_____	Frei	_____	_____	
_____	Other	_____	_____	

ADMISSION DIAGNOSIS _____						
POSSIBLE SOURCES OF INFECTION						
Name and Address	Age Sex Color	Occupation and Place of Employment	Date and Type of Exposure	EXAMINATION		
				Date	Physical: Type and Location of Lesions	Laboratory
1.						
2.						
3.						

SEX CONTACTS OF PATIENT FOLLOWING INFECTION						
1.						
2.						
3.						

ESTABLISHED SOURCE OF INFECTION						
HOUSEHOLD AND FAMILY CONTACTS OF PATIENT:						
NAME	AGE	SEX	RELATIONSHIP	EXAMINATION		
				Date	Physical: Type & Location of Lesions	Laboratory
1.						
2.						
3.						
4.						
5.						
6.						

HOUSEHOLD AND FAMILY CONTACTS OF THE SOURCE OF INFECTION						
1.						
2.						
3.						
4.						
5.						
6.						

MEASURES INSTITUTED				
HOSPITALIZED DATE AND PLACE WHEN RELEASED	ADMITTED TO CLINIC: DATE AND PLACE	UNDER CARE OF PRIVATE PHYSICIAN: NAME AND ADDRESS	UNDER OBSERVATION NAME AND ADDRESS OF CLINIC OR PHYSICIAN	
1.				
2.				
3.				

namely, the prenatal and pre-marital examination bills, will also serve as most effective case finding procedures. In New York City each year there are about 100,000 births and 70,000 marriages, which will result, therefore, in the annual serologic examination for syphilis of about 240,000 persons who otherwise might conceivably not be so examined.

No discussion of the epidemiology of syphilis would be complete in itself without a consideration of the facts recorded in the course of case investigation. Detailed record keeping is vitally important in the business of practical epidemiology. The form (Figure 1) has been drawn up in an attempt to indicate the course of procedure and essential data to be recorded for a complete epidemiological investigation of a case of early syphilis.

SPECIAL PROBLEMS

Certain difficulties are encountered in New York City in connection with the epidemiological investigation of syphilitic patients. One of the greatest problems is the lack of knowledge on the part of patients regarding the exact identity of the persons from whom they acquired the disease, as clandestine prostitutes and chance pick-ups. The patient may deliberately, or through no fault of his own, furnish the wrong information, resulting in failure to locate the named individual because of a fictitious address. There is, in addition, a large homeless and transient group in the city that is forever on the move; prostitutes will deliberately change quarters when they are being traced.

Some people who have changed residences are frequently located through the use of the mails, usually by a special delivery or a registered letter, marked "return receipt requested," and, in the case of families, through

schools, utility companies, or social and welfare agencies. A vast majority of the shifting population, however, leaves no forwarding addresses, either at old premises or with the local post office. As an example of this specific obstacle, of 566 individuals named as possible sources of infection during 1937 and the first three months of 1938, 212, or 37.5 per cent, were not located because of false addresses and frequent removals.

In some of the foreign quarters of the city, language difficulty presents another serious obstacle. While occasionally it is possible to have personnel familiar with the appropriate foreign tongue at certain clinics, this is not always possible.

PROGRESS IN THE FIELD

The following figures, covering the period of the entire year 1937 and the first half of 1938, indicate definite progress in New York City, despite the difficulties enumerated above.

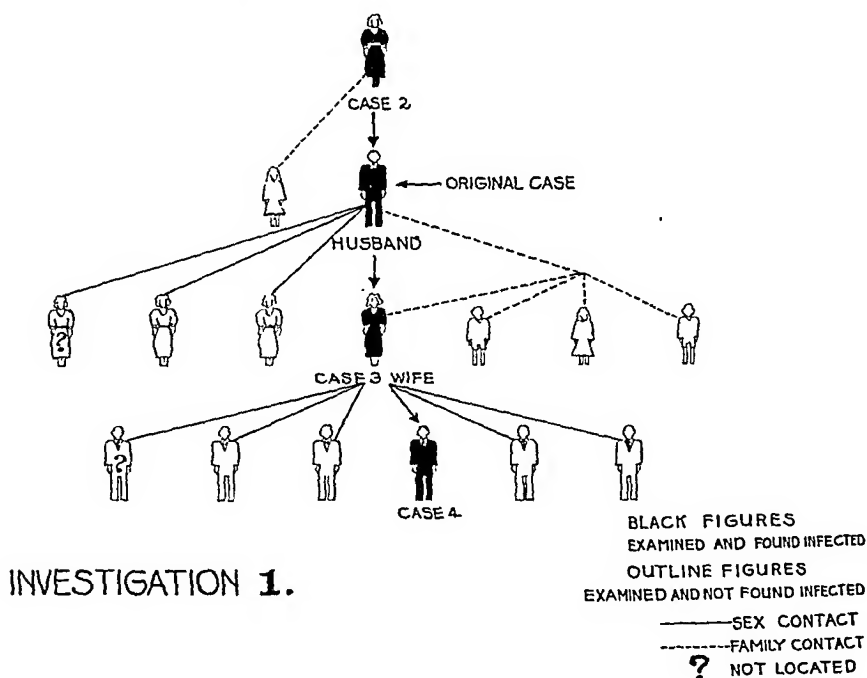
During the period under consideration, a total of 728 persons named as possible sources of infection of patients with early syphilis were investigated by the group of medical epidemiologists—394, or 54 per cent, were examined; 236, or 32 per cent, of those examined were found to be infected. Of 468 household and family contacts to patients with early syphilis named, 424, or 91 per cent, were examined, of whom 81, or 17 per cent, were found to be infected with syphilis.

The group of nurses and social workers followed 2,194 lapsed and delinquent patients, and succeeded in returning 61 per cent of this number to treatment. The home investigators made visits on a total of 25,552 patients and returned 58 per cent of these to treatment.

CASE REPORTS

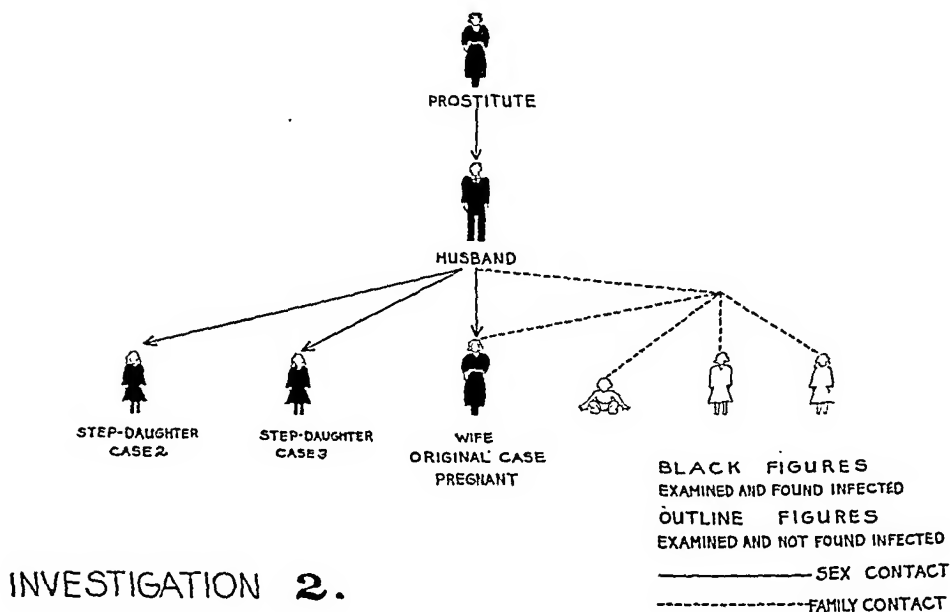
The practicability of epidemiological

LOCALIZED OUTBREAK OF SYPHILIS



CASE FINDING IN SYPHILIS

FOUR MEMBERS OF ONE FAMILY FOUND INFECTED



investigation of syphilis patients in New York City is illustrated by the following case reports:

Investigation 1—J. L., a white man, aged 48, was discovered to have primary syphilis on January 25, 1938. On investigation, it was believed that he had probably acquired his infection from Mrs. H. S., who was found to have early syphilis when she was brought in for examination. In addition to this woman, the patient admitted relations with three other persons, two of whom had no evidence of venereal disease; one could not be located because of false identification. On March 7, 1938, or about 2½ months later, the wife of J. L. developed secondary syphilis. She too proved to be promiscuous and admitted extra-marital sex relations with six men. Two of these were located and examined in New York, and showed no evidence of infection; one could not be found. The other men were examined by the health authorities in a neighboring state, with the result that one was discovered to have a strongly positive serological reaction and was placed under treatment, while the other two were found to be not infected. Four family contacts were examined and showed no signs of venereal disease.

Investigation 2—Mrs. I. S., a white pregnant woman in her 6th month of gestation was found to have secondary syphilis, and

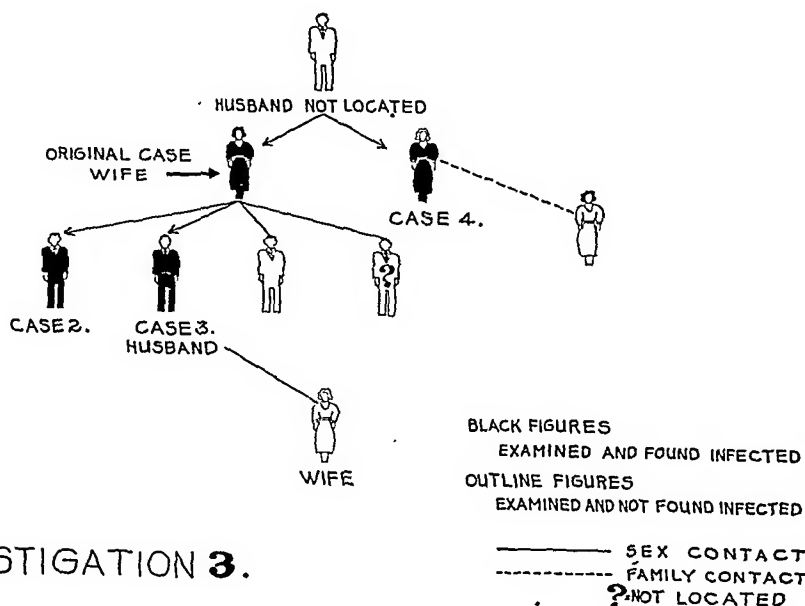
gonorrhea, and was placed under medical treatment. At that time her husband refused to be examined, and her four children were found to be negative clinically and serologically. An apparently healthy looking normal baby was born January 2, 1938, with no signs of congenital syphilis or gonorrheal ophthalmia.

Two months later, two of her female children, aged 10 and 12 years respectively, were hospitalized, after being found with active secondary syphilis. The husband and stepfather was then induced to submit to examination and was found to have generalized adenopathy, a penile scar, and a strongly positive serological reaction. He admitted infection by a prostitute about a year previously. It is believed that he had infected his wife and also two of his step-daughters, while his wife was in the hospital for delivery. The four infected members of the family were placed under treatment at one of the health department clinics.

Investigation 3—A colored female, aged 27, was found to have secondary syphilis. She had probably acquired the disease from her husband, who was stated to have been in "ill health" and had left her several months previously, leaving no trace of his whereabouts.

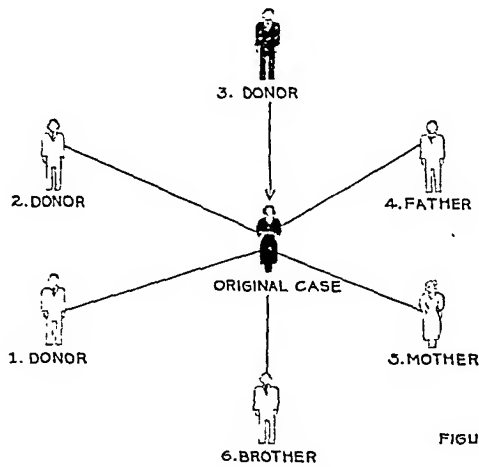
She admitted sexual promiscuity with four men, two of whom were subsequently found to have primary syphilis with penile lesions

SOURCE AND CONTACT TRACING IN EARLY SYPHILIS



INVESTIGATION 3.

TRANSMISSION OF SYPHILIS BY A BLOOD TRANSFUSION



FIGURES 1-3 BLOOD DONORS
4-6 FAMILY CONTACT

BLACK FIGURES, EXAMINED AND FOUND INFECTED
OUTLINE FIGURES, EXAMINED AND NOT FOUND INFECTED

INVESTIGATION 4.

and positive darkfield findings, while one had no evidence of infection, and another one could not be located. The wife of one of the infected men, on repeated follow-up examinations, fortunately has been found free thus far from the signs of syphilis.

During the course of this investigation, another woman appeared at the clinic with a cutaneous syphilide and named the husband of the initial case as the source of her infection. Several attempts to locate this man, both in New York and in a neighboring state, were unsuccessful. All of the four infected individuals have submitted to prescribed courses of treatment.

Investigation 4—Several instances of transfusion syphilis recently occurred in New York City. One of these cases was reported by a private physician in a 9 year old female child. Investigation revealed that the child had had three blood transfusions because of a streptococcal infection following a mastoidectomy about 3 months previously. None of the donors had had his blood tested for syphilis prior to transfusion, in spite of the fact that the regulations of the Sanitary Code require this of all professional donors.

With the consent of the cooperating physician, six persons, including the blood donors and the immediate family, were thoroughly examined. The last donor was found to have a strongly positive Wassermann reaction, and was considered to be the source of infection.

The responsibility of preventing

transfusion syphilis is a weighty problem in itself, and rests with the physician making the transfusion. All authorities agree that in order to reduce the risk of infection in the recipient, a rapid and reliable serologic test, as well as careful physical examination, should be performed on every donor immediately prior to transfusion.

CONCLUSIONS

1. Investigation of patients with early syphilis has been found effective in New York City, despite the problems presented by fictitious address, constant migration, and language difficulties.

2. The search for sources of infection, and contact tracing is equally possible in private practice as well as in clinic and hospital practice.

3. Reduction in the syphilis rate will be accomplished by intelligent application of well established principles of practical epidemiology, together with the cooperation of the physician in practice. Emphasis is laid upon the personal interest and activity of the

individual investigator in contradistinction to such indirect methods of approach as the use of the mails, and messages transmitted by patients to contacts and suspected sources of infection.

REFERENCES

1. Greenwood, Major. *Epidemics and Crowd Diseases*. New York, Macmillan, 1935, p. 15.
2. Parran, Thomas. The Control of Syphilis. *Ven. Dis. Inform.*, 18:226, 1937.
3. *Winthrop's Journals; 1630-1649*. Edited by J. K. Hosmer, New York, 1908, Vol. II, p. 268.
4. Munson, W. L. Practicability of Epidemiological Methods in the Control of Syphilis. *A.J.P.H.*, 22, 2:134-140 (Feb.), 1932.
5. Munson, W. L. Epidemiology of Syphilis and Gonorrhea. *A.J.P.H.*, 23, 8:797 (Aug.), 1933.
6. Smith, Dudley C. Practical Epidemiology of Syphilis. *Ven. Dis. Inform.*, Supp. No. 2, 1936, pp. 35-42.
7. Brumfield, W. A., Jr., and Smith, D. C. Transmission Sequence of Syphilis. *A.J.P.H.*, 24, 6:577 (June), 1934.
8. Weinstein, Joseph. On the Trail of the Spirochete and Gonococcus—The Epidemiology of Syphilis and Gonorrhea. *J. Social Hyg.*, 24, 1:15-22 (Jan.), 1938.
9. Rosenthal, Theodore, and Weinstein, Joseph. Anti-Syphilis Program in New York City—Enlisting the Cooperation of the Private Physician. *New York State J. Med.*, 38, 10:805-808 (May 15), 1936.
10. Ingraham, Louise B. The Persuasive Approach with the Infectious Syphilis Carrier—A Study in Public Health Method. *J.A.M.A.*, 107, 24:1990 (Dec. 12), 1936.
11. Kulcher, George V., and Ninnis, Earla I. Tracing the Source of Infection in Syphilis. *J. Social Hyg.*, 22, 8:370-373 (Nov.), 1936.
12. Rice, John L., and Goldberg, Jacob A. The Burden of Syphilis in New York City. *New York State J. Med.*, 36, 8 (Apr. 15), 1936.
13. Clarke, Walter C. New York City Reports Progress. *J. Social Hyg.*, 22, 8:364 (Nov.), 1936.
14. *Annual Report*, Bureau of Social Hygiene, New York City Dept. of Health, 1937.
15. Parran, Thomas. Syphilis from the Epidemiologist's Point of View. *A.J.P.H.*, 27, 2:152 (Feb.), 1932.
16. Long, William B. Prenatal Syphilis in Clinic Practice. *J. Social Hyg.*, 22, 5:251 (May), 1937.

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OUR PUBLIC HEALTH SERVICE

ON the first day of July, 1939, the United States Public Health Service was officially removed from the Treasury Department, in which it was born and in which it has spent its entire life up to that date—nearly 141 years—to the Federal Security Agency, created under the "Reorganization Act of 1939," approved April 3, 1939, and which by joint resolution of the House and Senate became effective July 1, 1939.

The Service had its origin July 16, 1798, when President John Adams signed the Act of Congress which provided for hospitals for the medical care of American seamen. The first hospital for disabled seamen was established by Virginia at Washington, Norfolk County, Va., under a legislative act in 1782, and this hospital became the first actually provided under the Federal Act of 1798 establishing the Marine Hospital Service, having been purchased by the Government in 1801. However, the first treatment of seamen under that Act took place at Boston in 1799.

The public health functions of the Service grew slowly. It was not until 1878 that Congress authorized extensive use of the Service as a federal health organization. In 1890 it was authorized specifically to assist in preventing the introduction of cholera, yellow fever, smallpox, and plague. In 1893, the quarantine functions of the Service were extended to include all infectious and contagious diseases, in coöperation with state and local health agencies.

Other public health functions were added from time to time, and this expansion was recognized in 1902, when the name was changed to United States Public Health and Marine Hospital Service, under which it remained until 1912, when the title under which it is now known was given.

In 1901, the founding of the Hygienic Laboratory was authorized for investigation of contagious diseases and other matters pertaining to public health, and the next year, 1902, the Service was charged with the duty of supervising and regulating the manufacture and sale of sera, vaccines, and similar products shipped in interstate commerce. In 1912, the duties of research were greatly broadened,

taking in the investigation of all diseases of man and the conditions tending to influence their propagation and spread, including sanitation and sewage and the pollution of navigable streams and lakes. Our National Leprosarium at Carville, La., was established in 1917. During the same year the Service became responsible for the physical and mental examinations of all arriving aliens.

The Narcotics Division, renamed Division of Mental Hygiene, was created in 1929, with hospitals at Lexington, Ky., and Fort Worth, Tex., for the confinement and treatment of narcotic addicts, and in 1930 a hospital was established at Springfield, Mo., for defective delinquents.

An important advance came this year (1930) in the creation of the National Institute of Health, which succeeded the Hygienic Laboratory, with very broad duties and powers of investigation.

In 1918, Congress created the Division of Venereal Diseases, with power to coöperate with state departments of health for the control and prevention of these diseases. These activities have been greatly extended by an Act of 1938.

The Social Security Act, approved 1935, imposed on the Service the duty of assisting states and districts to establish adequate health organizations and to train personnel. The National Cancer Act, approved 1937, established the National Cancer Institute, with wide duties of investigation and research as well as treatment, and also the assisting of similar activities by other agencies, public and private.

This sketch will give some idea of the multifarious duties and responsibilities of our Public Health Service, which touch every part of our country and affect the welfare of every individual citizen. It goes without saying that much has been omitted. Nothing has been said, for example, of the emergency demands on the Service, such as the care of sick and disabled soldiers, sailors, and marines after the World War for three years, until the Veterans' Bureau was organized. The location of the Marine Hospital Service in the Treasury Department was logical at the time it was founded. The Treasury was the department concerned with commerce and the revenue cutters early took part in the enforcement of state quarantine laws. As the functions of the Service broadened and it was growing into a national health organization its position in the chief fiscal agency of the Government became more and more anomalous. Proposals to move it have been made frequently.

Many have felt that the importance of the health of the Nation entitled it to a seat in the Cabinet and not so long ago strenuous efforts, which looked as though they might be successful, were made to bring this about. Other plans have died a more or less lingering death and the Service has remained in the house in which it was born until now.

Under the Treasury the Service has fared well. Successive administrations, regardless of their political complexion, have realized the necessity of supporting health work liberally, and, what is equally important, of allowing the officers of the Service a free hand in the planning and execution of their duties. A few exceptions to this rule have occurred, but even when an active Christian Scientist was Director of the Budget, no important injury was inflicted.

The continuous growth of the Service and the position it now occupies show that it has been well taken care of, and further, that it has commended itself to the Nation through effective work.

In the Federal Security Agency are grouped a number of agencies having to do with the health and welfare of the people. The association with these should

be helpful and mutually beneficial. We have every reason to expect for our Public Health Service liberal support, and from it a continuation of the activities which have made it known as one of the strongest governmental health organizations in the world.

SHOULD PUBLIC HEALTH BE ADMINISTERED BY THE COURTS?

PUBLIC health officials who have been attempting to discharge their duties conscientiously and impartially are sometimes distressed to find themselves confronted with indictments or injunction proceedings. Defenses against these legal actions not only may raise unwarranted doubts as to the integrity or ability of the health officer, but they are time-consuming, may interfere with the proper conduct of official duties, and are often unnecessarily expensive.

Several such incidents have recently occurred. The health officer of a large eastern city was indicted for alleged criminal action in permitting a nuisance due to dumping operations supervised by another department of the city. The health officer of a large mid-western city was among the many defendants in an indictment for an alleged conspiracy to violate the federal anti-trust laws, as claimed by the government to apply to the distribution of market milk.

An indictment is, of course, merely a charge, which must be proved in court to be sustained. It does not necessarily mean guilt, and the defendant health officers in these cases were vindicated, temporarily at least, when the indictments were dismissed by the courts. Many persons believe, moreover, that both of these indictments were inspired by political rather than by strictly legal motives, although on that matter we express no opinion.

Public health administration is primarily the responsibility of the executive branch of the government, as represented in this instance by the health department. When legitimately conducted, such administration deserves a minimum of interference from the judiciary.

Under the American system of government, however, every individual is properly entitled to his day in court in order to secure justice and to right any legal wrongs actually done to him. While the courts always have been liberal in upholding as valid all lawful and reasonable actions of public health officials, they have been equally alert to restrain health officers whose procedures have been unreasonable, arbitrary, oppressive, capricious, or malicious.¹ For wrongful acts, beyond the scope of his authority, any health officer in this country or in Canada may be liable in a civil or even in a criminal action brought against him by an individual citizen or by the government.

The most competent health official is, generally speaking, one who can perform his duties with a minimum of litigation, either by or against him. There are, nevertheless, occasions when court action is necessary as a last resort. For such occasions, the sagacious health official will be amply prepared by his conduct and by his familiarity with legal principles applicable to public health, to prosecute or defend his cause with success and credit to himself and his community.

REFERENCE

1. Tobey, J. A. *Public Health Law* (2d ed.), pages 286, *et seq.* New York: The Commonwealth Fund, 1939.

"IMPLEMENTING PUBLIC HEALTH"

ENGLAND, from which the awakening in public health matters came nearly 100 years ago, now announces another step forward in the appointment of a Committee on Research in Preventive Medicine.¹ With the announcement, however, there is a somewhat pessimistic note in certain journals. Twenty-five years ago in this country a noted student of public health said that if what we knew at that time could be translated into action, properly supported by laws and money, the death rate could be greatly reduced practically at once. Somewhat the same statement has been made over and over again with a great degree of truth. There is always a lag between discoveries in medicine and their practical application. The statement is made that in England in no field of medicine is this lag more evident than in public health. To a great extent this is true of America.

Immunization against diphtheria is given as an instance of one of the immediate problems which the committee has to consider. In spite of the proved efficacy of our preventive inoculations against diphtheria there is great difficulty in persuading the mass of people to have their children protected, and the rather astonishing statement is made for England that "the mortality-rate for diphtheria remains unaltered." Further, there is no town in England with an inoculation rate higher than 20 per cent and the protective injections are given chiefly between the ages of 5 and 10 years, while the greatest mortality in diphtheria is from 1 to 3. This pessimistic statement seems to contrast with the situation in America.

Each year there is a survey of the situation in regard to diphtheria which is published in the *J.A.M.A.* The cities of the country are divided into sections in which of course the incidence of diphtheria as well as the death rate varies somewhat. The latest report² covers 93 cities with an aggregate population of 38,885,435, in which there were 568 deaths, a rate of 1.46. Of these 93 cities, in 1935, 19 had a death rate of 5.0 or over. In 1936, 5 cities were in this class, and in 1937, only 3. In 20, the year passed without a single death from diphtheria. It is true that the actual number of deaths from diphtheria decreased only by 9, from 577 to 568, while the population increased from 36,777,112 to 38,169,704. These surveys began in 1923, in which year in an urban population of 31,060,848 the death rate per 100,000 was 13.13 against 1.46 in 1937 for 38,169,704 population.

The report says that there seems to be an increase in death rates which cannot be attributed wholly to the lack of intensive immunization programs, but it is concluded that there is evidence the extensive preventive program which has been carried on so widely throughout this country has resulted in a lowered death rate from diphtheria.

Our English friends suggest that the only proper way to test the efficiency of preventive inoculations is to select one city in which at least 90 per cent of its children on reaching the age of 12 months will be inoculated. This must be done with the collaboration of practising physicians and with the entire confidence of the medical profession and of the public. The suggestion is made that the new committee might very well attempt to discover an atmosphere in which such an experiment could be successfully put through in the ordinary routine of public health practice.

The make-up of the committee is interesting. It contains man with special knowledge in many branches of medical sciences, others whose lives have been

spent in public health administration. It includes members of the medical staff of the official health ministries of England and Scotland: The names of many of the committee are almost as well known in America as they are in England. The personnel assures us of a well considered and practical program which will be carried out with thoroughness. We can depend on findings through which England once again will demonstrate to the world her advanced conception of public health.

REFERENCES

1. *Lancet*, May 20, 1939, p. 1161.
2. *J.A.M.A.*, Aug. 6, 1938, p. 524.

Tenth Annual Meeting of the Western Branch

THE Western Branch of the American Public Health Association held its 10th Annual Meeting July 23-28 in Oakland, Calif., under the presidency of Guy S. Millberry, D.D.S., of San Francisco. This first branch of the Association was organized in 1928 and affiliated with the parent association in 1930, with membership from 11 western states, 3 western provinces of the Dominion, as well as from Alaska, Hawaii, and the Philippine Islands. The meeting proved to be a notable occasion, not only because of an excellent program but in attendance as well. More than 700 persons registered for the meetings, or practically as many as attended the meeting of the A.P.H.A. in Pasadena 5 years ago. During the same week the Sixth Pacific Science Congress met in the Bay District, and there were more than 100 papers dealing with medical and public health subjects besides those regularly scheduled for the Western Branch.

The meetings of related groups were unusually fruitful and these included a dental congress, a conference of state supervising nurses, a round table of state and local registrars of vital statistics, meetings of the staff of the U. S.

Indian Service, of nutritionists, of state and local venereal disease directors, and a round table of state sanitary engineers.

Although several important reports were presented bearing on public health problems of particular interest to the western area, the most noteworthy event was without doubt the symposium on Health Education, under the chairmanship of Professor Ira V. Hiscock of Yale University. This symposium ran through 4 half-day sessions and included the participation of numerous specialized consultants. There were also round tables on the evaluation of administrative practices and on maternal and neonatal care. More than a decade of industrious work on the part of our western colleagues has resulted in a splendid organization whose fruits are readily apparent. The Branch installed Dr. Frederick D. Stricker of Oregon as President, and recognized the long service of Dr. William P. Shepard of San Francisco as Secretary by unanimously electing him President-elect. Dr. W. Ford Higby of San Francisco succeeds Dr. Shepard in the post as Secretary.

BOOKS AND REPORTS

Robert Koch: *Sa Vie et son Oeuvre*—By Dr. Emile Lagrange. Paris: M. Legrand (Boulevard St-Germain, 93), 1939. 90 pp. Price, \$.50.

The author deplores the fact that outside of Germany there is no adequate biography of Robert Koch, although everyone knows of the tubercle bacillus, the comma bacillus of cholera, and what is known as Koch's phenomenon. In English, except for the short article by Nuttall, one of a series on German bacteriologists, the only mention of Koch is in *Microbe Hunters*, by De Kruif, which he describes as a "clever but whimsical essay."

In a book on Koch's work one naturally turns to tuberculosis. From this we find an almost complete absence of knowledge of American work. The author speaks of Koch's blunder at the London Congress on Tuberculosis in 1901, mentions the disagreement with his stand by Lord Lister, Nocard, Bang, and McFadyean, but does not mention the American, the only person who gave facts to disprove Koch's statement; nor does he seem to have heard of the final proof given the next year (1902) of the communicability of the bovine tubercle bacillus to human beings. Again we must point out that this was American work done at the University of Pennsylvania. It has stood the test of time and has been corroborated in every country. There is no excuse for this omission by the author. He gives credit properly to Theobald Smith for having pointed out the differences between the human and the bovine bacillus before Koch, but his acquaintance with the American

literature concerning tuberculosis seems to end there. The author says 15 years before, but this is an error. (See *Trans. Assn. Amer. Physicians*, XI (1896) 75.) Elsewhere in speaking of the researches of Koch on malaria, he gives Theobald Smith credit for having been the first to have shown the transmission of disease by the bite of an insect, but he neglects to give equal credit to Kilborne, who did the work conjointly with Smith.

The author goes into the personal life of Koch and tells about his divorce and later marriage to an actress in Berlin. He also gives some incidents which are not generally known. For example, in speaking of anthrax, he says Koch tried to take credit away from Pasteur, although Pasteur had with absolute courtesy given full credit to Koch for what he had done. In spite of this, in Geneva, Pasteur was acclaimed as a second Jenner. He says that Koch was so jealous that the honors done Pasteur "prevented Koch from sleeping."

With the exception of more or less unimportant matters such as those mentioned, the book contains nothing new. The last two pages give an impartial comparison of Pasteur and Koch, especially in regard to what they accomplished. He places them along side of Ampere, Faraday, J.-B. Dumas, Darwin, Lister, Laennec, Bernard, and Virchow, and ends by saying that on account of their services to humanity they assuredly occupy the first place and due to their genius the sciences of hygiene and modern medicine were born.

For some years past the Europeans

have recognized American work. We cannot but think that the author of this work is very much behind the times and would profit by studying American literature. He signs himself as an inspector in hygiene in the Ministry of Public Health in Brussels. Entirely apart from the diseases, the elucidation of which brought such deserved fame to Koch and Pasteur, the author could learn a great deal from American literature concerning the general handling of all matters concerning hygiene and public health. Otherwise the book can be recommended for pleasant reading.

MAZÛCK P. RAVENEL

League of Nations—Survey of National Nutrition Policies, 1937–38—*New York: Columbia University Press, 1939. 120 pp. Price, \$.60.*

The Assembly of the League of Nations in 1937 began a movement which was designed to further the study of "the state of national nutrition and to improve nutritional standards," proposing at the same time that a meeting of the National Nutrition Committees be held annually.

Reports given to the Assembly by representatives of the National Nutrition Committees from 16 countries furnish the basis of the material incorporated in this book, in which a mass of facts of interest to the layman as well as to the nutrition specialist are presented in a summarized, easily readable form.

The survey includes: A report of the progress of the work of the League in regard to nutrition problems; a discussion of the type of work delegated to the National Nutrition Committees, the power of the committees, and sources of financial support for carrying out investigations; suitable methods for making nutrition surveys, in twenty countries, concerning the nutrition of the inhabitants; methods used in various countries to alleviate existing con-

ditions of under-nutrition; a discussion of economic situations in relation to nutrition; a report of special research problems on the vitamin and chemical composition of foods, and methods available for educating the public in regard to the underlying principles of proper nutrition.

All reports indicate (as is to be expected) that the plane of nutrition of the group is directly related to the level of the income. In addition such factors as: climatic and topographic conditions; types of soil, and amount per capita accessible for the production of food materials; transportation, care in handling and methods of preserving food; an understanding of the principles of nutrition and a knowledge of wise spending of the income, all have an important bearing on the problem of proper human nutrition.

ADELIA WEIS

A Synopsis of Hygiene—*By Sir W. Wilson Jameson, M.D., and G. S. Parkinson, with a Section on Personal Hygiene by G. P. Crowden (6th ed.). London: J. & A. Churchill, Ltd., 1939. 687 pp. Price, \$.625.*

From the first edition of this book which appeared in 1920 until the sixth in 1939, it has always been of the highest quality and practically beyond criticism as judged by the claims of the authors. We learn from the Preface to this edition that the sections dealing with occupation and health, hospitals, maternal welfare, and milk have been completely recast, and that the law relating to food and drugs and to factories has been restated owing to recent legislation. The book is largely a synopsis of current public health administrative practice based on official reports and memoranda which are cited in the text, generally with the date. There are, however, further references to original sources which one may consult.

The book has been brought up to date, as shown by the inclusion of material concerning the legislation as to Public Health (Aircraft) Regulations, 1938.

The one criticism which might be made is the small amount of space given to insects which carry disease, a trifle over 7 pages, with only one illustration. One could wish also, though this is not a criticism, that the authors could have given us more of their own ideas and not stuck quite so closely to their expressed purpose to "present so far as possible only official or generally accepted views."

One cannot study a book of this sort without learning a great deal and acquiring admiration for the careful and methodical way in which the material is presented. It is more a book for public health workers and students than medical students. Its usefulness for this country is somewhat limited by the fact that all of the current references are to British laws, regulations, reports, etc. We could wish that someone would do for America and American laws regarding public health what the authors have done for England. All through, abbreviations, of which the English are very fond but which are not understood in this country, are used, though a list of them is given at the beginning of the book.

It is hard to speak too highly of this work, in spite of the drawbacks mentioned as far as use in America goes. The printing and make-up are excellent and there is a good index. Only 16 illustrations are given.

MAZŮCK P. RAVENEL

Taking Care of the Family's Health: A Teaching Guide for Rural Classes—*By Elma Rood and Gertrude Lingham. Madison College, Tenn.: Rural Press, 1938. 3 parts in 2 books. 597 pp. Price, \$5.00; flexible fabrikoid, \$6.50.*

These two volumes may be classed as a manual designed to give practical teaching help to persons in the public health field. Sixteen instructional units are organized under three headings: (1) The Family in Health, (2) The Family in Illness, and (3) The Family and Public Health.

Many practical ideas adapted to rural conditions are given, but one wonders if suggestions for several types of approaches dependent on needs and interests might be more helpful than considerable detail on teaching technics. Values of several good illustrations would have been increased by the use of descriptive titles. However, the activities proposed are excellent and the subjects of the units are well chosen, being topics especially appropriate for rural groups. Procedures are suggested for class periods and opportunity is given for the imaginative nurse or teacher to use her own initiative in the adaptation of material. The price of these volumes may limit their use.

IRA V. HISCOCK

Hereditary and Environmental Factors in the Causation of Manic-Depressive Psychoses and Dementia Praecox—*By Horatio M. Pollock, Benjamin Malzberg, and Raymond G. Fuller. Utica, N. Y.: State Hospitals Press, 1939. 473 pp. Price, \$2.50.*

The importance of research into the etiological factors of mental disease is yearly receiving greater recognition. This volume, dealing with hereditary and environmental factors in two of the most important groups of the functional psychoses is one of the series of research studies undertaken jointly in 1928 by the New York State Department of Mental Hygiene and the State Charities Aid Association, with the financial assistance of the Laura Spelman Rockefeller Memorial.

The method employed in this study was to examine in detail the family and

environmental history of two groups of patients with mental disease. One group consisted of 155 first admissions with manic-depressive psychoses, and the other of 175 first admissions with dementia praecox. A study of the family histories of these two groups showed that in both cases there was more mental disease in these families than is to be expected in a corresponding random sample of the general population. However, in neither case was it possible to show that Mendelism explained the transmission of manic-depressive psychosis or dementia praecox.

The authors draw the conclusion that "It (mental disease) requires something in addition to a diathesis or predisposition. There must not only be a seed but a ground in which to plant the seed. Inferior human stock may still be enabled, through proper nurture, to achieve a life of a fair degree of usefulness. On the other hand, we know that even the soundest of stock may succumb to the repeated onslaught of an unfavorable environment."

Although the study only confirms the views generally held rather than shedding new light in the approach to the problem of preventing the occurrence of mental disease, the authors are to be congratulated on their work in applying statistical methods to such a difficult field in a manner that allows for definite conclusions.

The book is readable, is well printed, and should receive a warm reception from all interested in the progress of mental hygiene from its present status to one in which prevention of mental disease will take its proper place.

GRANT FLEMING

ical Research Council, Industrial Health Research Board Report No. 80. New York: Chemical Publishing Co. of New York, Inc., 1938 (1st American ed., by permission of His Majesty's Stationery Office, London). 388 pp. Price, \$3.50.

This is a very valuable book, thorough, careful, up-to-date, and readable. The claim that it consists of summaries of published articles, is far too modest, as it is a critical evaluation of those articles. When an author fails to present sufficient data to support his theses, when conclusions are drawn but the bases therefor are not given, that fact is stated. The critical attitude is maintained throughout, although expressed with due brevity. For instance, the views of Duvoir and of Flury and Zernik concerning chronic intoxication in man through petroleum spirits are given, but with the comment that no authority for the statements appears and even the exact variety of petroleum distillate is not given. The articles reviewed cover the period up to December, 1935, with a few of later date. The chapters on coal tar distillates and on the chloro compounds were of special interest to the reviewer and in her treatment of controversial features in those fields the compiler displays a very intelligent neutrality. The contents include (I) The Hydrocarbons, (II) The Chloro Compounds, (III) The Alcohols, (IV) The Esters, (V) The Cyclohexane Derivatives, (VI) The Ketones, (VII) The Glycol Group, (VIII) Miscellaneous: Carbon Disulfide. Ethyl Ether. Iso-Propyl Ether. Pyridin.

A full bibliography is given at the end of each chapter and there is a very satisfactory index.

ALICE HAMILTON

Toxicity of Industrial Solvents: Summaries of Published Work—Compiled by Ethel Browning under the direction of the Committee on the Toxicity of Industrial Solvents. Med-

Alcohol: One Man's Meat—By Edward A. Strecker and Francis T. Chambers. New York: Macmillan, 1938. 230 pp. Price, \$2.50.

Alcoholism and mental disease are age-old twins. Together they present a problem that has baffled social and medical efforts from time immemorial. But science, taking up the challenge, is throwing new light on some of its physical and mental aspects. It has, for example, demonstrated that alcohol is a narcotic drug, not a stimulant, and it has shown the relationship between alcoholism and vitamin B₁ and C deficiency on the one hand, and injury to the nervous system on the other, a relationship of far-reaching social and psychiatric importance. And this advancing knowledge offers a basis for the rising hope that the drinking problem, in some of its forms at least, will progressively yield to therapy and prevention.

The book under review is an unusually valuable contribution toward a better understanding, by the layman and student, of the fundamentals of a social evil that has been the despair of reformers for centuries. It lights up the psychological, physiological, and social factors that are at the basis of the drinking habit and clarifies the problem considerably; and by its reporting of the impressive results secured by the authors in their treatment of certain types of alcoholics, through "an intensive psychological reëducational approach," shows the possibilities of dealing constructively with the problem.

The authors differentiate between the "normal" and the "abnormal" drinker, and describe drinkers who have a "psychic allergy" to alcohol, in contrast to those who "can take it." Allergic individuals, they say, simply and sensibly, "should never drink alcohol, for even when they take it in relatively small quantities they are not normal drinkers." One man's meat is, indeed, another man's poison. The abnormal drinker, on the other hand, whether allergic or not, is the man who cannot face reality without alcohol, but

"whose adequate adjustment to reality is impossible as long as he uses alcohol." These are the excessive drinkers, to whom alcohol is a mechanism of escape, a release from inhibitions, the magic that brings euphoria and anesthesia. Here the impulse to intoxication is rooted in the conflict between instinct and ideal, and alcohol is the great solvent, the treacherous boon to man's ego.

In this interesting and highly readable treatise we are given an instructive, scientific, and practically useful interpretation and evaluation of the why's and wherefore's of drinking and of the psychiatric approach to its management and control. Of special value is its hopefulness of outlook which should do much to encourage the provision of institutional and clinical facilities, now all too meager, for the special study and treatment of alcoholic addiction. Best of all is the sound philosophy of the book which points the sober attitude, the middle road we should take between the extremes represented by prohibition on the one hand and the night-club era on the other. Education for temperance is the ultimate, rational answer.

PAUL O. KOMORA

The Microbe Man: A Life of Pasteur for Young People—By Eleanor Doorly. New York: Appleton-Century, 1939. 160 pp. Price, \$1.50.

Of the many ardent Pasteurians, quite a number shared their enthusiasm by writing books about Pasteur. These books differ more in style and garb than they do in subject matter for the standard work of Rene Vallery-Radot, *La Vie de Pasteur*, is available to all with itching pens.

The author's approach is that of an imaginative tourist. She visited the many places made famous by this great man, all faithfully. Thereafter she returned to her home in England, where she is a school teacher who graduated

into head mistress, and wrote another book about Pasteur.

Her presentation is for young readers. Herself a teacher, Miss Doorly's book has a smooth flow presenting the essential facts of Pasteur's life within reach of a child's vocabulary and interest.

The book is embellished by an introduction by Professor Pasteur Vallery-Radot.

W. W. PETER

The Canned Food Reference Manual—*New York: American Can Company, 1939. 242 pp. From the Company.*

This booklet is a striking example of enlightened advertising. When we consider the enormous part which the art of canning plays in the preservation of food and in our everyday life it is of great importance that the public should have correct information concerning the processes involved as well as the general effect on the foods preserved in this manner.

This book is the third of the series issued by the American Can Company and has been prepared to amplify and extend rather than to replace the publications which have preceded it. After a short history of canning there are accounts of the processes involved in canning, beginning with the manufacture of tin plate, fabrication of cans, and going through to the selection of foods and the basic operations through which they are put, ending with the heating and subsequent cooling.

The next section treats of canned foods in human nutrition in which are given the nutritive requirements of the body, the story of the vitamins, their standards, units, and stability. The public health aspects of canned foods are discussed, and an account given of 20 years of research concerning canning. One section is largely practical and gives the government regulations concerning processed or packaged foods,

their specifications and grades, while the last section gives the Federal Food, Drug, and Cosmetic Act.

There is an Appendix carrying 23 items, all of them practical and useful in everyday life, not only to the housekeeper but also to the physician and the nutrition expert. A good index ends the book. The work is thoroughly documented and the material has been submitted to the Council on Foods of the A.M.A. for review and acceptance before publication. The illustrations are abundant and excellent.

MAZÛCK P. RAVENEL

Immunity Principles and Application in Medicine and Public Health—*By Hans Zinsser, John F. Enders, and LeRoy D. Fothergill (5th ed. of "Resistance to Infectious Diseases"). New York: Macmillan, 1939. 782 pp. Price, \$6.50.*

The material is divided into two sections, one devoted to principles and theory and the second to special immunological problems in individual infections.

Four chapters give critical discussions of infection, virulence, antigens, toxins, and immunity, six chapters deal with the nature of antibodies and various antigen-antibody reactions such as toxin-antitoxin, bactericidal, agglutination, precipitation, iso-antibodies and blood groups. Five chapters are devoted to hypersensitiveness. Section II deals with immunity to virus and allied diseases, immunity in syphilis, tuberculosis, diphtheria, tetanus, and other anaerobic infections, scarlet fever and other streptococcal infections, staphylococcal infections, meningitis, pneumonia, the enteric infections, and whooping cough. Three chapters are devoted to applied immunology in bacterial and virus diseases, and in snake-bite poisoning.

The authors say they have "attempted to retain much of the character

of the previous editions and to meet the need for increased correlation between the principles revealed in laboratories and their applications to the problems of the clinic and of public health." They are to be congratulated on the success they have achieved in attaining their goals. The arrangement of subject matter has been distinctly improved.

There are a few places where some ambiguity may exist relative to a few fundamental concepts. This is illustrated by the attempt, on page 374, to modernize the old definition of an antigen by saying "a rational comprehension of immunological processes necessitates an inclusion in the biological conception of antigenic substances *all materials* which, in contact with the animal body, lead to a specifically altered reaction capacity." That the authors do not regard formaldehyde, iodine, etc., as true or complete antigens is indicated by earlier discussions and on pages 376 and 377. Likewise the statement (pages 445 and 446) that "there is evidence to indicate that there is *no* stable union between virus and antibody, etc." and that "Enders and Shaffer have carried out experiments with pneumococcus and pneumococcus antibodies which both in principle and results, are entirely analogous to the virus-antibody 'dilution' phenomena of Schultz and Andrews." It is doubtful whether the authors wish to claim that in general bacterial antibody does not form a fairly firm union with its antigen or that complete dissociation of any bacterial antibody from its homologous antigen can be readily obtained by dilution as might be inferred from these and a few succeeding paragraphs.

On scarlet fever the reviewer is left with the impression that while the authors are apparently in agreement that the erythrogenic toxins are responsible for the rash and certain other

phenomena yet perhaps in spite of the apparent positive stand taken, they are either in doubt or in disagreement as to whether the etiology is settled in its entirety.

Some apparent inaccuracies or inadequacies in references to the literature occur. On page 340 a translation of Morgenroth's "Collected Studies in Immunity" is quoted to the effect that Magendie's early experiments on anaphylaxis were done on dogs. Richet in his treatise on anaphylaxis and also Doerr in Kraus and Levaditi's Handbuch (p. 858, Band 2, 1909) quote Otto's review of Morgenroth as saying that Magendie used rabbits. The authors (page 353) describe Manwaring's perfusion experiments on dogs and cite his conclusions but omit later work by others which puts a different interpretation upon his results. On page 360 it is stated that Schultz in 1910 showed that smooth muscle from sensitized animals would "react, by contraction, to amounts so small that they had practically no effect upon the normal tissue." Schultz's early experiments were very crude and it was Dale who refined the technic and called attention to the importance of distinguishing toxic from non-toxic doses of antigen in smooth muscle experiments. The citation of Wells (page 363) while correct in so far as it goes is misleading in that it might easily be interpreted as representing Wells's objections to the histamine theory. If ten more lines from Wells's book had been included they would have portrayed accurately his views.

While the book, because of the regrettably short time allotted to immunity in the medical curriculum, is too large to be used as a didactic text and lacks many valuable references it is nevertheless a splendid example of what it is intended to be—a critical treatise expanded to include chapters that correlate the principles revealed in the

laboratories and their application to the problems of the clinic and of public health.

The subject matter is well arranged and does not contain a noteworthy number of typographical errors. While the index is fairly good, it is hardly adequate considering the large amount of material presented. The publishers are to be congratulated upon their achievement.

N. P. SHERWOOD

The Span of Life—By William Marias Malisoff. Philadelphia: Lippincott, 1937. 339 pp. Price, \$2.50.

The author is a research chemist, inventor, professor in the Graduate School in the University of Pennsylvania, and editor of *Philosophy of Science*. He is eminently qualified to bring together a great variety of interesting things on the subject of the span of life.

Life at its oldest includes the big 12,000 year old macrozamia tree in Queensland and small organisms revived by surviving Russian scientists after these biological specimens spent from one to 3,000 years in arctic ice. It is easier to determine the approximate age of some of these ancient forms of life than for the human beings who have crept into legends of longevity: Adam, 930 years; Seth, 912; Enos, 905; and Methuselah, 969; or to prove that Methuselah begat children at 187, and Noah at 500. It is a lopsided list of humans for, strangely, no woman is included among the long-livers.

The author reviews a wide assortment of theories as to what determines longevity, ranging from popular hokuspokus involving palm readers and astrologers to the more elaborate theories constituting the pitfalls of scientists. Systolic blood pressure, weight, aortic and radial pulse, calcium content of the blood, gastric acidity, anatomic changes in the knee joints,

structural transformation of the thyroid, are some of these.

Use has been made of laboratory animals in ingenious experiments. Rats and rabbits lost an assortment of their internal organs, had to eat a variety of foods or starve, were controlled in their mating, and the number of days added to or subtracted from their average span of life were determined.

The author quotes definitions of life in terms of chemistry, physics, electricity, and architecture of the atom as advanced by many philosophers and scientists, among them Bichat, who said: "Life consists in the sum of the functions by which death is resisted."

"Apparently the definition and treatment of life varies with the level of discussion the definer has in mind. He may be thinking of the physical level, the biological level, the psychological level, perhaps even the theological level; as he 'raises' the level he is likely to deny that the discussion at other levels is about life altogether." But "all the molds crack; they are too narrow, above all too rigid, for what we try to put into them." About almost every definition one can say, "Yes and more."

Finally the author moves toward one reasonable proposal for belief and action in the form of this thesis, "The hope of prolonging life indefinitely is the proper thing for science. All research should be organized with that as the supreme goal." W. W. PETER

Man Against Himself—By Karl A. Menninger. New York: Harcourt, Brace, 1938. 485 pp. Price, \$3.75.

The ingenuity and fertility of the Freudian theories in explaining some of the mysteries of human behavior are beautifully exemplified in this second major work of Dr. Karl Menninger, probably the most successful public interpreter of psychoanalysis among its practitioners in this country. The brilliant and dynamic author of *The*

Human Mind, best seller among the many lay treatises on the new psychologies that have appeared during the past decade, again shows his gift for popular exposition, this time in an attempt to elucidate some of the occult psychological mechanisms involved in the "manner of man that kills," in his aggressions toward himself and others. And the upshot of his elaborate thesis, based on Freud's concept of the death instinct, juxtaposed against the instinct of self-preservation, is that man is his own worst enemy, as the title of the book implies.

How the conflict between the destructive and constructive impulses in man takes place, the complexities and ramifications of this morbid phenomenon in human nature, the diversity of its manifestations, and the significance of its outcome for the present and future welfare of the race—such is the subject matter of this analytic and, in a way, novel and daring study of the riddle that is man.

Taking as his point of departure and frame of reference the age-old problem of suicide, which he analyzes in characteristic Freudian fashion, Dr. Menninger builds up a complicated conceptual structure in which he sees asceticism and martyrdom, neurotic invalidism, alcoholic addiction, anti-social behavior and mental disease as so many forms of "chronic," progressive suicide, and this not in a merely analagous sense—in which, for example, we say that people, through dietary indiscretions, "dig their graves with their teeth"—but as the actual result of unconscious motivations based on the self-destructive impulse. Even the aggressions of the habitual criminal "lead

to self-destruction in the sense of imprisonment, misery and deprivation."

So pervasive and insidious is the "death instinct" that, in the development of his thesis, the author includes self-mutilation, malingering, polysurgery, purposive accidents, impotence and frigidity—classifying these under the heading of "focal" or localized suicide—and a whole range of physical diseases and disorders—denominating these as "organic" suicide. In the process he dissects, with his analytic knife, many an established ethical, moral and religious concept, showing, as he claims, the psychopathology underlying much in human behavior that masquerades as virtue. The book is replete with interestingly presented and well documented case material illustrating the far reach of his concepts.

How and when the aggressive impulses are thwarted in their overt projections and are turned inward, thus leading to self-destruction, is an obscure and highly complex psychological process that requires studious effort if the reader is to grasp the closely reasoned arguments the author employs so engagingly and with such *gusto* in defending his thesis. These extensions of the psychoanalytic theory of self-destruction to a variety of problems in human morbidity are not offered as scientifically proven demonstrations, but are rather a compound of clinical observation and philosophic speculation based on Freudian concepts and, in their deductions, highly plausible and tenable, if we accept the basic premise. It is an interesting hypothesis that stands or falls with the body of psychoanalytic doctrine.

PAUL O. KOMORA

BOOKS RECEIVED

- TEXTBOOK OF BACTERIOLOGY. By Hans Zinsser and Stanhope Bayne-Jones. 8th ed. New York: Appleton-Century, 1939. 990 pp. Price, \$8.00.
- PUBLIC WORKS ENGINEERS' YEARBOOK 1939. By American Public Works Association, Chicago, 1939. 457 pp. Price, \$3.50.
- MEDICOLEGAL PHASES OF OCCUPATIONAL DISEASES. An Outline of Theory and Practice. By C. O. Sappington. Chicago: Industrial Health Book Co., 1939. 405 pp. Price, \$2.75.
- EDUCATIONAL PSYCHOLOGY. Personality and What Shapes It. By D. W. La Rue. New York: Nelson, 1939. 397 pp. Price, \$2.50.
- SYPHILIS AND ITS ACCOMPLICES IN MISCHIEF: SOCIETY, THE STATE AND THE PHYSICIAN. By George M. Katsainos. Athens, Greece: Author, 1939. 676 pp. Price, \$5.00.
- HISTORY OF THE LONDON COUNTY COUNCIL, 1889-1939. By Sir Gwilym Gibbon and Reginald W. Bell. New York: Macmillan, 1939. 696 pp. Price, \$7.00.
- SYNOPSIS OF PULMONARY TUBERCULOSIS. By Jacob Segal. New York: Oxford, 1939. 150 pp. Price, \$2.75.
- MAN AGAINST MICROBE. By Joseph W. Bigger. New York: Macmillan, 1939. 304 pp. Price, \$2.50.
- THE ADMINISTRATION OF OLD AGE ASSISTANCE. By Robert T. Lansdale, Elizabeth Long, Agnes Leisy, and Byron T. Hipple. Chicago: Public Administration Service, 1939. 345 pp. Price, \$3.75.
- COMMISSION ON NUTRITION IN THE COLONIAL EMPIRE. First Report. Part I. Nutrition in the Colonial Empire. 210 pp. Price, \$90. First Report. Part II. Summary of Information Regarding Nutrition in the Colonial Empire. 145 pp. Price, \$75. London: His Majesty's Stationery Office, 1939.
- IMPROVISED EQUIPMENT IN THE HOME CARE OF THE SICK. By Lyla M. Olson. 3d ed. Philadelphia: Saunders, 1939. 264 pp. Price, \$1.50.
- NUTRITION AND PHYSICAL FITNESS. By L. Jean Bogert. 3d ed. Philadelphia: Saunders, 1939. 602 pp. Price, \$3.00.
- PNEUMONIA. With Special Reference to Pneumococcus Lobar Pneumonia. By Roderick Heffron. New York: Commonwealth Fund, 1939. 1086 pp. Price, \$4.50.
- TUBERCULOSIS AND SOCIAL CONDITIONS IN ENGLAND WITH SPECIAL REFERENCE TO YOUNG ADULTS (A Statistical Study). By P. D'Arcy Hart and G. Payling Wright. London: National Association for the Prevention of Tuberculosis, 1939. 165 pp. Price, \$1.00.
- REPORT OF THE WATER POLLUTION RESEARCH BOARD FOR THE YEAR ENDED 30TH JUNE, 1938, WITH REPORT OF THE DIRECTOR OF WATER POLLUTION RESEARCH. London: His Majesty's Stationery Office, 1939. 57 pp. Price, \$30.
- EPIDEMIC ENCEPHALITIS. Etiology, Epidemiology, Treatment. Third Report by the Matheson Commission. New York: Columbia University Press, 1939. 493 pp. Price, \$3.00.
- HEALTH AND PHYSICAL EDUCATION. Class and Record Book. By Hugo Fischer. New York: Barnes, 1939. Price, \$75.
- YOUR EXPERIMENT IN LIVING. By Michael A. Cassidy and Helen Gay Pratt. New York: Reynal & Hitchcock, 1939. 153 pp. Price, \$1.75.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Health in All New York—Here you will find a stimulating example of descriptive reporting. The true journalist selects some rather bizarre activities from among the wealth of more sober material that so large an organization as the combined New York City health agencies furnishes. The professional health publicist probably would choose otherwise, but we question whether he would be more successful in packing a revealing story in a very small space. One choice sentence: "Public health is separated by a line as theoretical as the Tropic of Capricorn into preventive and curative medicine."

ANON. Health and Hospitals. *Fortune* 20, 1: 97 (July), 1939.

Our Unenviable Smallpox Record—About 15,000 reported cases of smallpox during 1938 constitute an eloquent testimonial to our collective common sense. New Jersey has not had a case in 7 years. Seven western states with a smaller combined population have had 12,000 cases in the same time. We have not had outbreaks of the virulent type since the middle 20's, but when we do the fat will be in the fire.

ANON. Why Smallpox? *Pub. Health Rep.* 54, 25: 1091 (June 23), 1939.

Some Health Profits—Of the young men recently called to the British Army only 2.3 per cent were found unfit for military duty. If, as the minister of health suggests, this vastly better showing is the result of the improved health services, there is reason to hope that another generation will be in even better shape, for in 1918 and 1919 when the present crop of recruits were born,

infant hygiene and school health services were still in a nebulous state, and the drive for decent housing was a long way from beginning.

ANON. Editorial Notes. *J. Roy. San. Inst.* 2, 7: 397 (July), 1939.

Canadian Certification of Sanitarians—In Canada, the Public Health Association grants the degree C.S.I. to persons who pass qualifying examinations and present evidence of stipulated standards of training and experience. It is hoped that eventually only C.S.I.'s will be employed by municipal health departments. Is there a hint here for us?

ANON. Report of the Committee on the Certification of Sanitary Inspectors. *Canad. Pub. Health J.* 30, 6: 309 (June), 1939.

Praise for the Public Health Nurse—Emphasis upon the necessity for a working partnership between nurses and other professional groups in the public health program, marks this plea for more and better public health nursing.

ATWATER, R. M. The Place of the Public Health Nurse in a Community Program. *Canad. Pub. Health J.* 30, 6: 278 (June), 1939.

Life Expectancy and You—Useful for many purposes is this table of expectation of life comparing rates now and at the time of other "World's Fairs." Not only is the longevity outlook better at birth, but so is the expectancy at older ages. It is only human for any health official to take both interest and pride in this accomplishment.

DUBLIN, L. I. Increasing Life Expectancy. *Neighborhood Health* (New York City Dept. of Health) 5, 4: 8 (July), 1939.

Quality of Material in Infant Manufacture—Neonatal mortality and stillbirth rates among babies born to mothers who had previously had infant losses were significantly greater than the rates among children of mothers who had not suffered such misfortune. The implications of these findings to agencies giving prenatal care with limited nursing staffs should be evident. There are other social agencies, too, that may well give heed to this phenomenon.

GARDINER, E. M., and YERUSHALMY, J. Familial Susceptibility to Stillbirths and Neonatal Deaths. *Am. J. Hyg.* 30, 1: 11 (July), 1939.

Is Rheumatism Handed Down?—Evidence is presented which suggests that a hereditary constitution may play a rôle in the predisposition to rheumatic disease, but it cannot exclude the possibility that exposure and infection may be the predominating factors.

GAULD, R. L., *et al.* Further Observations on the Occurrence of Rheumatic Manifestations in the Families of Rheumatic Patients. *Milbank Quart.* 17, 3: 263 (July), 1939.

One Hundred and Forty-one Years—In this brief history of the Public Health Service you will find some information that you already have and much that you should. As the service passes from the Treasury Department the occasion is used to review the steps by which it grew to its present place of influence.

HAMPTON, B. C. The Public Health Service Leaves the Treasury Department. *Pub. Health Rep.* 54, 26: 1133 (June 30), 1939.

Thought-Control Clinic—Health officials will be impressed with the group method of treating emotional disorders which has proved its worth in one city dispensary. Individual psychotherapy for the horde of neurotics who need public assistance is entirely beyond the

means of any health agency. This is a way out of the dilemma.

HARRIS, H. I. Efficient Psychotherapy for the Large Outpatient Clinic. *New Eng. J. Med.* 221, 1: 1 (July 6), 1939.

Health Problems in Education—Tentatively proposed, a statement of health policies for school adoption is discussed briefly by a school physician, a physical educator, a practising physician and administrator. This and the accompanying article deserve serious reading. The schools' responsibilities include a healthful environment, care of accidents, control of communicable diseases, teaching health habits, repeated physical examinations, and training of teachers.

HUMPHREY, J. H., *et al.* School Health Problems. *J. A. M. A.* 113, 1: 63 (June 1), 1939.

Perish the Thought Department—How public health administration works in England is told by the head worker. On paper, the British unified scheme of things sanitary certainly reads better than would a comparable report upon the jumble of agencies and activities hereabouts. That it could possibly be better, no red-blooded, two-fisted, he-American would for a moment admit.

MACNALT, A. The Health Services of England and Wales. *Canad. Pub. H. J.* 30, 6: 269 (June), 1939.

Deficiency Diseases and War—Aside from whatever military value it may possess, this paper on the behavior of Republican Spaniards will prove immensely interesting to sanitarians. During the 30 months of air raids, about the same number of Barcelonians were killed by bombs as in street accidents during the same time. It wasn't TNT, but lack of butter, that broke morale. Children were less worried than adults about danger.

MIRA, L. Psychiatric Experience in the Spanish War. *Brit. M. J.* No. 4093, 1217 (June 17), 1939.

American Legion Child Health Program—"In concluding," concludes this author, "I would like to summon . . . all of those groups definitely interested in the improvement of child health and child life to combine so that their combined influences may eliminate from our American Life disease, ignorance, poverty, propaganda, and politics." That, in a word, is some job.

MITCHELL, E. C. Child Health in National Defense. J. A. M. A. 113, 1: 1 (July), 1939.

Natural Vitamins or Fortified Foods—This symposium or fortification of foods, is an absolute "must" for every reading list. Some of the highlights: "whole fresh foods properly selected can support abundant health without addition or sophistication. But . . . urban populations must subsist on foods that are neither whole nor fresh . . ." From another paper: ". . . diets of our people at their best have no great margin of safety, and a significantly large proportion of them . . . are deficient in one or more of the dietary essentials." And this from still another: ". . . we are justified in locating our public health problems in the prevention of dietary deficiency disease in that section of the population with the lowest income. . . . Actually, we are making it more difficult for them to obtain these foods for . . . the addition of vitamins to food will increase the cost." And there is a lot more.

MORGAN, A. F., *et al.* The Fortification of Foods with Vitamins and Minerals. Milbank Quart. 17, 3: 221 (July), 1939.

What You Should Know about

Tuberculosis—If you will not read the whole article, you simply must read the sections headed "Well Established Facts," and "The Future." No matter what your job may be, you should know that: treatment has no influence on primary tuberculosis; children's preventoria are not justified; routine X-raying children's chests is no longer profitable; more first infection occurs in adults than in children. There is a lot more that you should know.

MYERS, A. J. The Physician and Tuberculosis. J. A. M. A. 113, 3: 189 (July 15), 1939.

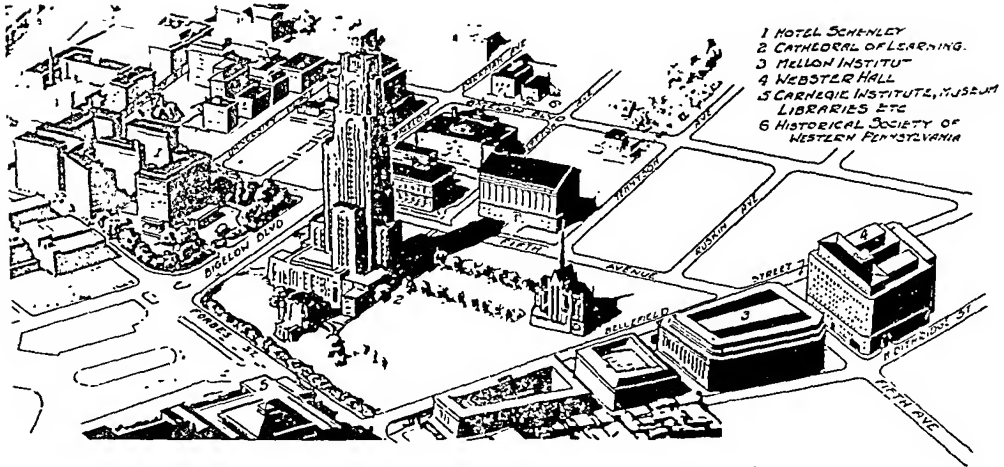
Health State of the Nation—Briefly surveying recent progress made in the several fields of the national health program through joint federal and state action, the Surgeon General welcomes the annual conference of state health officials. In the succeeding paper the principal actions of the conference are summarized.

PARRAN, T. State and Territorial Health Officers Annual Conference with the U. S. Public Health Service. Health Officer 4, 2: 56 (June), 1939.

O.T. vs. P.P.D.—Purified Protein Derivative, in the studies reported, gave evidence of greater specificity than Old Tuberculin. Health workers in the tuberculosis control field will find much of value in related findings of the study, but the above nubbin will be about enough for the rest of us to store away in the back of our several noodles.

SEIDEMAN, R. M. A Comparative Study of Old Tuberculin and the Purified Protein Derivative. Am. J. Hyg. 30, 1: 1 (July), 1939.

OAKLAND CIVIC CENTER AREA
 INCLUDING
 THE UNIVERSITY OF PITTSBURGH



Pittsburgh's Entertainment Plans

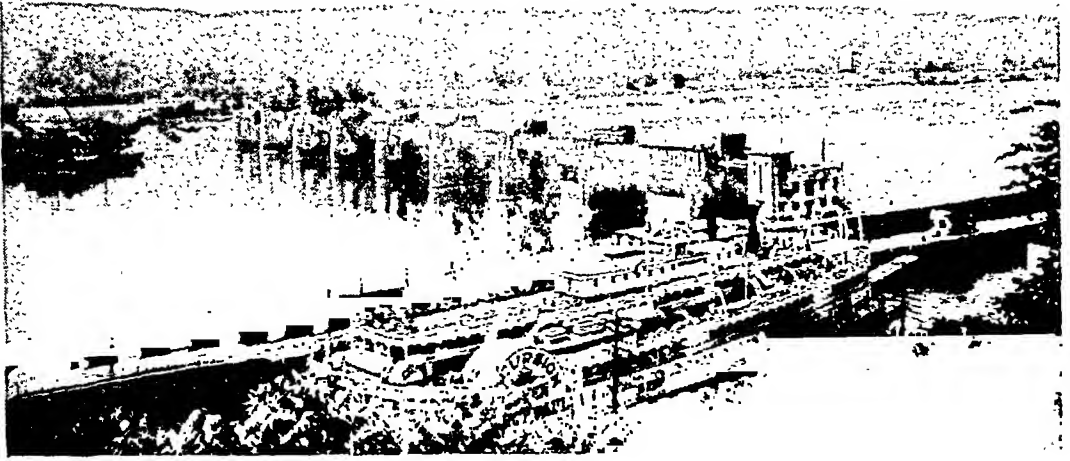
DELEGATES to the A.P.H.A. convention in Pittsburgh who arrive early will be welcomed Sunday and Monday, October 15 and 16, by the Reception Committee and the Women's Entertainment Committee. Members of both of these groups will be available all week to give their services in helping to plan enjoyable days for the visitors, to suggest diversions and shopping tours, and to arrange for golf at Pittsburgh's private clubs.

The President's Reception will be held on Tuesday evening, and dancing will be in order immediately following the Reception.

Wednesday evening will be devoted to the dinners of the various sections. Among them will be an informal dinner held jointly by the Tri-State Food Association and the Pennsylvania Public Health Association. After the dinner the groups will join in a public meeting

at which the speakers will be Arthur T. McCormick of Louisville, Ky., and Henry F. Vaughn of Detroit, Mich. The Industrial Hygiene Section is planning an elaborate program for the same evening in celebration of its twenty-fifth anniversary.

A sight-seeing trip is planned for Thursday afternoon. Visitors will be taken in buses across the Allegheny River to the North Side and then along a route which views the Home of the 57 Varieties, the new Allegheny General Hospital, the Buhl Planetarium, and the famous old Allegheny Market, now the North Side Market. The buses will then proceed to the Point Bridge and cross over the junction of the Allegheny and Monongahela Rivers to the South Side. There ascent will be made by incline to Mt. Washington for a view of Pittsburgh's Golden Triangle. The trip will continue to the Oakland



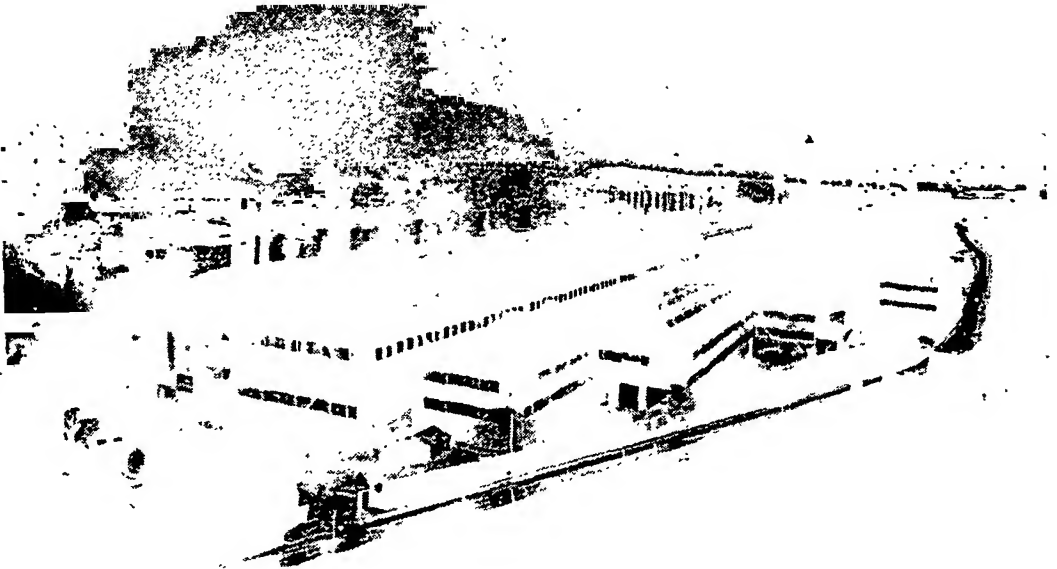
Courtesy of U. S. Army Engineers, Pittsburgh

Elmsworth, one of Pittsburgh's 25 locks and dams on the Ohio River

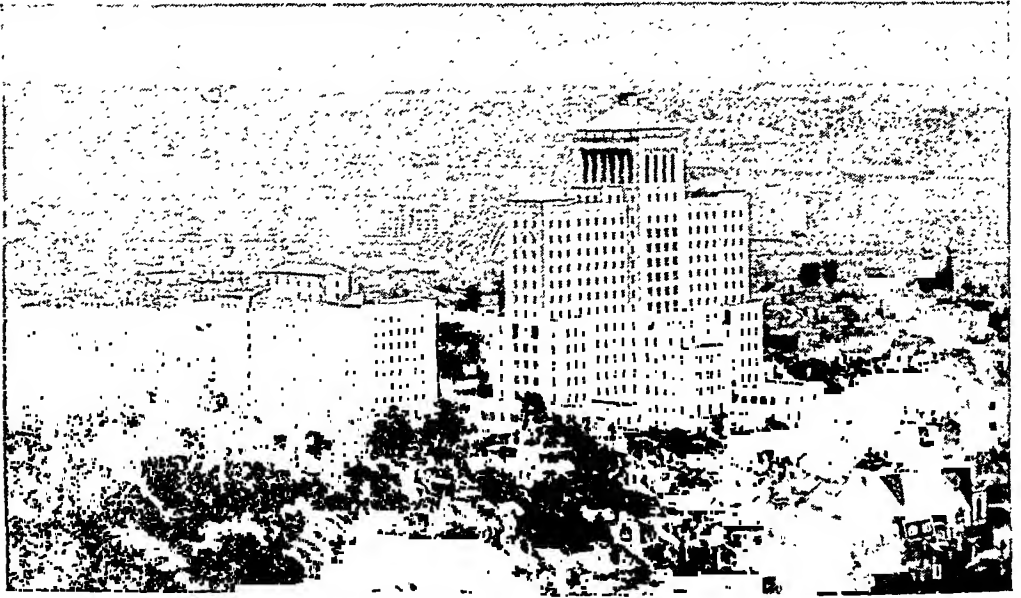
District for visits to the Cathedral of Learning, Foster Memorial Hall, Heinz Memorial Chapel, the Medical Center of the University of Pittsburgh, Mellon Institute, and the Carnegie Library and Art Institute where the International

Art Exhibit will be open. Finally the party will go to the Hotel Schenley for tea. Later the guests will be returned to the downtown district.

Thursday evening the Banquet of the Association will be held in the Chatter-



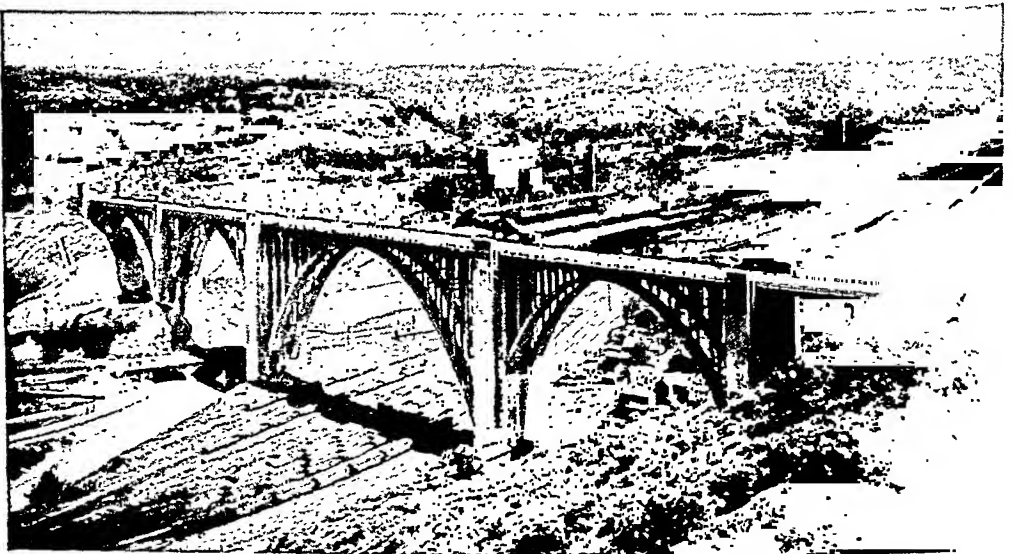
New Lights were added to the Pittsburgh industrial night scene when Jones & Laughlin Steel Corporation opened its new \$25,000,000, 96 inch continuous strip mill. Extending for more than a half mile along the Monongahela River within sight of Pittsburgh's Golden Triangle, this mill was the first for the manufacture of wide sheets and strip in the Pittsburgh District. The glare in the background is from Bessemer Converters on the other side of the river.



Allegheny General Hospital

box of the William Penn Hotel. After-dinner speeches will be limited both in length and number so that time may be preserved for the entertainment to follow. It is hoped that the guests at the Banquet will be given something of a surprise in the way of entertain-

ment. The Medical Gridiron Club has been responsible for many good-natured ribs in the past. It is rumored that they are to be augmented by some experienced artists who will attempt to cast the light of travesty upon some of the pet foibles of the A.P.H.A.



George Westinghouse Bridge, Lincoln Highway, East Pittsburgh

TRIPS

The following schedule has been arranged by the Committee on Scientific Trips. For detailed descriptions of these tours, see the August issue of this *Journal*.

Tuesday morning:

A visit to the City Filtration Plant at Aspinwall

Tuesday afternoon:

A visit to the U. S. Bureau of Mines and an alternate trip to the Cooking Utensil Division of the Aluminum Co. of America

Wednesday morning:

A visit to the Mine Safety Appliances Company

Wednesday afternoon:

Trips to the H. J. Heinz plant and the Jones and Laughlin Steel Company

Thursday morning:

A trip to the Westinghouse Electric and Manufacturing Company in East Pittsburgh

Friday afternoon:

Groups will be shown through the new building of Mellon Institute



Allegheny Observatory located in Riverview Park

ASSOCIATION NEWS

SIXTY-EIGHTH ANNUAL MEETING

Pittsburgh, Pa., October 17-20, 1939

HEADQUARTERS — HOTEL WILLIAM PENN

RAILROAD FARES FROM VARIOUS POINTS TO PITTSBURGH, PA.

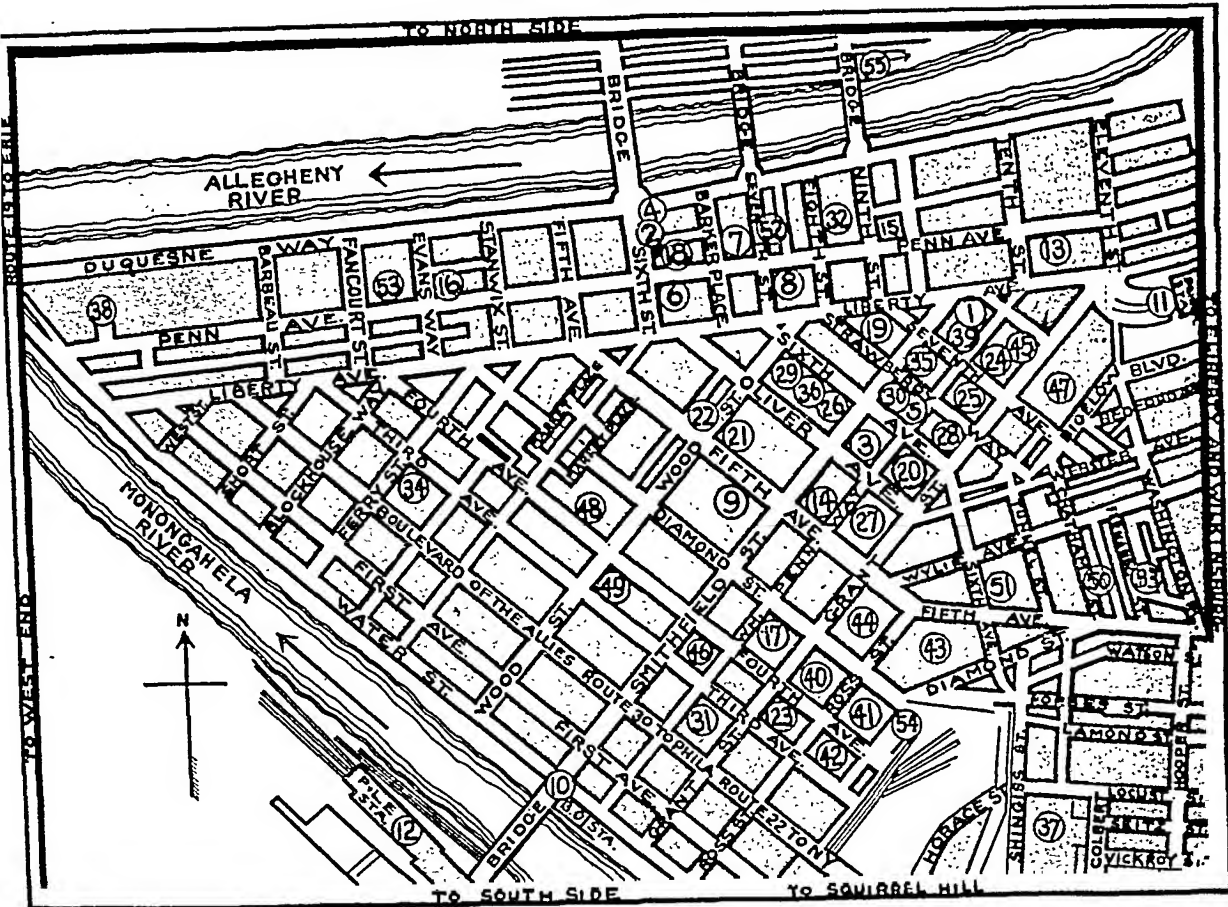
AMERICAN PUBLIC HEALTH ASSOCIATION
OCTOBER 17-20, 1939

<i>From</i>	<i>One-way Pullman Travel</i>	<i>Round-trip Pullman Travel</i>	<i>One-way Lower</i>	<i>One-way Upper</i>
Atlanta, Ga. ¹	\$23.75	\$42.50	\$5.80	\$4.40
Baltimore, Md.	9.05	18.10	2.65	2.00
Boston, Mass.	20.10	40.20	4.50	3.40
Buffalo, N. Y.	7.75	15.50	2.65	2.00
Chicago, Ill.	14.10	28.20	3.15	2.40
Cleveland, Ohio	3.95	7.90	2.10	1.60
Dallas, Tex.	38.24	64.50	10.00	7.60
Denver, Colo.	45.16	74.80	10.80	8.20
Detroit, Mich.	8.85	17.70	2.65	2.00
Duluth, Minn.	27.77	48.75	6.30	4.80
Fort Worth, Tex.	38.24	65.80	10.00	7.60
Indianapolis, Ind.	11.15	22.30	3.15	2.40
Jacksonville, Fla. ²	32.76	57.60	8.40	6.40
Kansas City, Mo.	26.90	48.90	6.30	4.80
Louisville, Ky.	12.80	25.60	3.15	2.40
Los Angeles, Calif.	79.65	118.50	19.70	15.00
Memphis, Tenn. ¹	24.20	43.40	6.30	4.80
Milwaukee, Wis.	16.65	32.05	3.15 ³	2.40
Minneapolis, Minn.	26.31	46.55	5.80	4.40
Nashville, Tenn. ¹	18.52	33.75	4.50	3.40
New Orleans, La. ¹	34.50	58.30	8.40	6.40
New York, N. Y.	13.15	26.30	3.15	2.40
Omaha, Nebr.	29.01	50.65	6.30	4.80
Philadelphia, Pa.	10.45	20.90	2.65	2.00
Portland, Ore.	78.44	118.50	19.70	15.00
Salt Lake City, Utah	58.89	87.55	13.95	10.60
San Francisco, Calif.	79.65	118.50	19.70	15.00
Seattle, Wash.	78.44	118.50	19.70	15.00
St. Louis, Mo.	18.55	37.10	4.50	3.40
Washington, D. C.	9.05	18.10	2.65	2.00
Montreal, Que. ⁴	21.00	42.00	5.55	4.20
Halifax, N. S. ⁴	41.95	83.90	9.30	8.00
Ottawa, Ont. ⁴	20.00	40.00	5.55	4.20
Quebec, P. Q. ⁴	26.65	53.30	5.55 ⁵	4.20
Toronto, Ont. ⁴	11.50	23.00	2.65 ⁶	2.00
Vancouver, B. C.	78.44	118.50	19.70	15.00

1. Via Cincinnati
2. Via Washington
3. Pullman to Chicago only

4. Via Buffalo
5. Pullman to Montreal only
6. Pullman to Buffalo only

THE GOLDEN TRIANGLE PITTSBURGH, PA.



Courtesy of This Week in Pittsburgh

SHOWN ON THE MAP

THEATERS

- 1—Senator
- 2—Alvin
- 4—Fulton
- 5—Nixon
- 6—Penn
- 7—Barry
- 8—Stanley
- 9—Warner
- Art Cinema (Liberty & Eighth St.)

RAILROAD STATIONS

- 10—Baltimore & Ohio
- 11—Pennsylvania
- 12—Pgh. & Lake Erie
- 54—Fourth Ave. Station

HOTELS

- 13—Fort Pitt
- 17—Pittsburgher

- 18—Roosevelt
- 20—William Penn
- Keystone, Wood Street

PRINCIPAL BUILDINGS

- 21—Farmers Bank
- 22—First National Bank
- 23—Grant
- 24—Gulf
- 25—Koppers
- 26—Oliver
- 27—Union Trust
- 55—Heinz Plant
- Jenkins Arcade (Liberty & Penn)

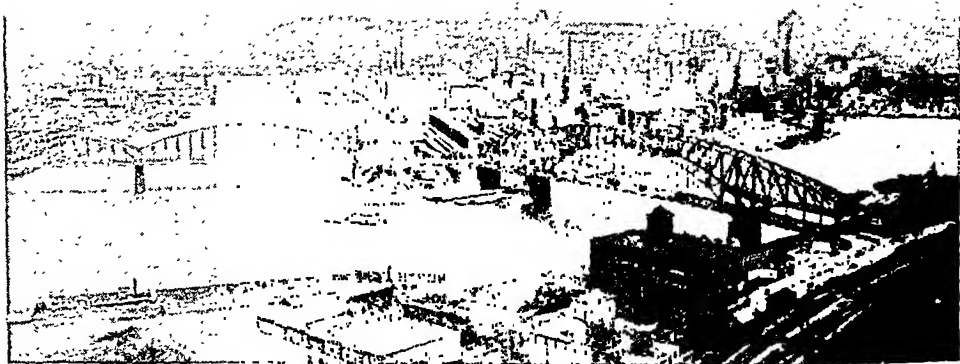
CHURCHES

- 28—First Lutheran
- 29—First Presbyterian
- 30—German E. P.
- 31—Salvation Army

- 32—Second Presbyterian
- 33—St. Peter's
- 34—St. Mary's Catholic
- 35—Smithfield M. E.
- 36—Trinity

PUBLIC BUILDINGS

- 37—Duquesne University
- 38—Block House
- 39—Chamber of Commerce
- 40—City-County
- 41—New County
- 42—County Morgue
- 43—County Jail
- 44—Court House
- 45—Federal Reserve
- 46—Old U. S. Post Office
- 47—New U. S. Post Office
- 48—Pgh. Stock Exchange
- 49—Y.M.C.A.
- 50—Y.W.C.A.



“The Golden Triangle” and the “Point.” The junction of the Allegheny and Monongahela Rivers to form the Ohio

PITTSBURGH HOTELS

Hotel	Room Capacity	Single Room		Double Room	
		Without Bath	With Bath	Without Bath	With Bath
William Penn Hotel	1,800		\$3.50-\$5.00		\$5.00-\$8.00
Roosevelt Hotel			2.50- 3.00		4.00- 4.50
The Pittsburgher	400		3.00- 4.00		4.50- 6.00
Hotel Schenley			3.50- 4.50		6.00- 8.00
Hotel Fort Pitt		\$1.50-\$2.00	2.50- 3.50	\$3.00	3.50- 6.00
Hotel Webster Hall	600	\$2.00	2.50- 3.50		5.00- 7.00
Hotel Keystone			2.50- 3.00		4.00- 7.00

.....(Cut off on this line and mail to the hotel of your choice).....

HOTEL RESERVATION BLANK FOR THE PITTSBURGH MEETING
AMERICAN PUBLIC HEALTH ASSOCIATION
OCTOBER 17-20, 1939

To
(Name of Hotel)

Please reserve for me rooms for persons
for the A.P.H.A. Meeting.

Single room Double room
Maximum rate per day for room \$. Minimum rate per day for room \$.

I expect to arrive If date of arrival is changed I will notify
you at least 24 hours in advance.

Please acknowledge this reservation.

Name
Street address
City State

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

- Thomas T. Box, M.D., Chatom, Ala., Washington County Health Officer
 Paul M. Golley, M.D., La Fayette, Ga., County Health Commissioner, Walker-Catoosa District
 Kalman S. von Haitinger, M.D., 417 West Buttes St., Midland, Mich., Director, Midland County Health Dept.
 Carl J. Hawley, M.D., C.P.H., 302 California State Bldg., San Francisco, Calif., Medical Officer, State Dept. of Public Health
 William H. Hatfield, M.D., Cor. 10th & Willow St., Vancouver, B. C., Canada, Director of Tuberculosis Control, Provincial Board of Health
 Robert M. Hursh, M.D., 709 North Third St., Harrisburg, Pa., Health Officer
 Walter B. Johnson, M.D., C.P.H., City Hall, Cumberland, Md., Assistant Health Officer
 Robert A. G. Jones, M.D., Currituck, N. C., Assistant District Health Officer, State Board of Health
 Richard Kui Chi Lee, M.D., Dr.P.H., 2663 Lowrey Ave., Honolulu, Hawaii, Deputy Health Officer and Director, Services for Crippled Children, Board of Health
 Thomas D. Menser, M.D., C.P.H., Box 703, Colorado Springs, Colo., Director, City-County Health Unit
 Miles D. Ridle, M.D., Shelby, Mont., Health Officer, City of Shelby and Toole County
 John J. Shaw, M.D., State Dept. of Health, Harrisburg, Pa., Secretary of Health
 Irving E. Simmons, M.D., C.P.H., Quincy, Fla., Director, Gadsden County Health Unit
 Ralph J. Sykes, M.D., Weldon, N. C., Health Officer, Halifax County
 James A. Taylor, M.D., D.P.H., Box 390, Abbotsford, B. C., Canada, Medical Health Officer, Fraser Valley Health Unit
 Arthur F. Williams, M.D., 220 East Beaver Ave., Fort Morgan, Colo., Health Commissioner, City of Fort Morgan and Morgan County

Laboratory Section

- Reed M. Broadbent, B.A., Iron County Hospital, Cedar City, Utah, Bacteriologist, State Board of Health
 Anthony J. Lamberti, M.S., 2418 South Millick St., Philadelphia, Pa. Director, Bacteriology Laboratory, Villanova College
 Mrs. Duncan R. Neilson, M.A., 2133 N.E.

- 13th Ave., Portland, Ore., Serologist, State Board of Health
 Norman J. Pyle, V.M.D., Lederle Laboratories, 195 N. Middletown Road, Pearl River, N. Y.

Vital Statistics Section

- Stuart T. Friant, Michigan Dept. of Health, Lansing, Mich., Director, Bureau of Records and Statistics
 Myra E. Hilpert, A.B., 611 South Capitol Ave., Lansing, Mich., Public Health Statistician, Michigan Dept. of Health
 Helen R. Parker, B.Com., 512 Linden Ave., Victoria, B. C., Canada, Statistician, Division of Vital Statistics, Provincial Board of Health
 Noel R. Rawson, M.B., D.P.H., Dept. of Health and Public Welfare, Legislative Bldg., Winnipeg, Manitoba, Canada, Director of Vital Statistics

Public Health Engineering Section

- John D. Faulkner, B.S., 1824 White Oak Road, Raleigh, N. C., Assistant Engineer, State Board of Health
 Francis de Sales Friel, 1520 Locust, Philadelphia, Pa., Chief Engineer, Albright and Friel, Inc.
 Otto L. Fritz, A.B., City Hall, Room 4, Tucson, Ariz., Chief Sanitarian, Tucson-Pima County Health Service
 A. John Horn, 385-93rd St., Brooklyn, N. Y., Water and Sewage Engineer and Chemist, Pease Laboratories
 Harry M. Ramsey, 610 East Washington St., Lewistown, Mont., Sanitary Inspector, Health Dept.
 Byron N. Souder, M.S., Woods Hole Oceanographic Institution, Woods Hole, Mass.
 Frank J. Tatum, B.S.Ed., 1310 Front Ave., Coeur d'Alene, Idaho, State Sanitarian, Division of Public Health
 George Y. Zane, B.S., Board of Health, Wailuku, Maui, Hawaii, Senior Sanitary Inspector

Industrial Hygiene Section

- Gennaro Basilicato, M.D., Marshall, Mich., W. K. Kellogg Foundation Fellowship
 Louis B. F. Raycroft, 19th St. & Allegheny Ave., Philadelphia, Pa., Coöperating with U. S. Public Health Service on Lead Survey

Frederick W. Sands, Fidelity & Casualty Co.
of New York, 80 Maiden Lane, New York,
N. Y., Assistant Chemist

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Indianapolis, Ind., Director, Dairy Council
of Indianapolis

Child Hygiene Section

Harold Jacobziner, M.D., 105 Clarke Place,
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Dept.

Public Health Education Section

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Ann Arbor, Mich., Student, University of
Michigan

F. M. Hemphill, M.Ed., State Dept. of
Health, Austin, Texas, Health Education
Consultant

Harry L. Liss, 535 Fifth Ave., New York,
N. Y., Director, Public Health Bureau,
New York State Optometric Association

Basil C. MacLean, M.D., Strong Memorial
Hospital, Rochester, N. Y., Director

Jean G. McKay, M.A., 180 Claremont, Apt.
63, New York, N. Y., Instructor, Dept. of
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Hazel E. Altmann, 321 North Thayer St.,
Ann Arbor, Mich., Student, University of
Michigan

Helen Bodley, B.S., 1811-14th Ave., Greeley,
Colo., District Advisory Nurse, Colorado
Division of Public Health

Vesta Bowden, M.A., 304 North Commercial
St., Trinidad, Colo., Public Health Nurse,
Maternal and Child Health Unit

Miriam K. Christoph, B.S., C.P.H., 402
Court House, Minneapolis, Minn., Director,

Hennepin County Rural Public Health
Nursing Service

Ione Coyle, R.N., A.B., 145 East Idaho St.,
Boise, Idaho, Orthopedic Supply Nurse,
Crippled Children's Service, State Division
of Public Health

Eva J. Dugger, Ph.B., Westminster, Colo.,
Supervisor, Maternity Homes and Hos-
pitals, State Dept. of Health

Winifred M. Mendez, R.N., 17 Taft Ave.,
Santurce, Puerto Rico, Instructor of Pub-
lic Health Nurses, Dept. of Health

Florence J. Woods, R.N., P. O. Box 197,
Seldovia, Alaska, District Public Health
Nurse, Territorial Dept. of Health

Epidemiology Section

LeGrand B. Byington, M.D., C.P.H.,
U.S.P.H.S. Laboratory, 14th Ave. & Lake
St., San Francisco, Calif., Surgeon

Robert F. Korn, M.D., C.P.H., District
State Health Office, Saranac Lake, N. Y.,
Epidemiologist-in-Training

Eugene E. Lamoureux, M.D., State Dept. of
Health, Hartford, Conn., Epidemiologist

Emma H. MacChesney, R.N., State Dept. of
Health, Albany, N. Y., Consultant Nurse
in Communicable Diseases

Unaffiliated

Fred P. Bestgen, M.D., Allen Rumsey Hall,
Ann Arbor, Mich., Student, University of
Michigan

Robert A. Downs, D.D.S., 1120 Olivia St.,
Ann Arbor, Mich., Student, University of
Michigan

Gerhard Hartman, B.A., M.B.A., 18 East
Division St., Chicago, Ill., Executive Sec-
retary, American College of Hospital Ad-
ministrators

Merl V. Seney, B.S., Box 196, Butte, Mont.,
with Parke Davis & Co.

Alexander Witkow, M.D., 702 Ocean View
Ave., Brooklyn, N. Y.

APPLICANTS FOR FELLOWSHIP

(Additional to names published in August Journal)

In accordance with the By-laws of the Association, the names of applicants for Fellowship are officially published herewith. They have requested affiliation with the Sections indicated. Action by the various Section Councils, the Committee on Eligibility, and the Governing Council will take place between now and the time of the Pittsburgh Annual Meeting.

Health Officers Section

James B. Black, M.D., Dr.P.H., Director,
Rutherford County Health Department,
Murfreesboro, Tenn.

George A. Hays, M.D., Executive Health
Officer, Flint, Mich.

Walter N. Kirkman, Chief, Division of Per-
sonnel and Accounts and Secretary, State

Board of Health, Baltimore, Md.
Winston H. Tucker, M.D., Ph.D., Commissioner of Health, Evanston, Ill.

Laboratory Section

George P. Berry, M.D., Consultant, Rochester General Hospital, Rochester, N. Y.
Meridian R. Greene, Sc.D., Instructor in Bacteriology, University of California, Los Angeles, Calif.
John F. Kessel, Ph.D., Professor of Bacteriology and Parasitology, School of Medicine, University of Southern California, Los Angeles, Calif.
Ralph S. Muckenfuss, M.D., Director, Bureau of Laboratories, Department of Health, New York, N. Y.
Leland W. Parr, Ph.D., Professor of Bacteriology, Medical School, George Washington University, Washington, D. C.
Cassandra Ritter, M.A., Bacteriologist, Water Laboratory, State Board of Health, Lawrence, Kansas

Vital Statistics Section

Willis C. Beasley, Ph.D., Psychologist, U. S. Public Health Service, Washington, D. C.

Martin B. Woodward, M.D., C.P.H., Director, Bureau of Vital Statistics, State Department of Health, Columbia, S. C.

Industrial Hygiene Section

Anna M. Baetjer, D.Sc., Associate in Physiological Hygiene, Johns Hopkins School of Hygiene and Public Health, Baltimore, Md.

Child Hygiene Section

Howard B. Mettel, M.D., Director, Bureau of Maternal and Child Health, State Board of Health, Indianapolis, Ind.

Public Health Nursing Section

Mary E. Tennant, B.Sc., Director of Nursing, International Health Division, Rockefeller Foundation, New York, N. Y.

Unaffiliated

Jack G. Baker, Chief, Bureau of Foods and Drugs, Department of Public Health, San Diego, Calif.
Charles N. Leach, M.D., C.P.H., Field Director, International Health Division, Rockefeller Foundation, New York, N. Y.

DECEASED MEMBERS

Joseph S. Caceres, Hilo, Hawaii, Elected Member 1930
P. P. Causey, M.D., Courtland, Va., Elected Member 1932
Clifford Charlock, Hilo, Hawaii, Elected Member 1920, Elected Fellow 1924
Hoyt E. Dearholt, M.D., Milwaukee, Wis., Elected Member 1910, Elected Fellow 1923
H. E. Ferguson, M.D., Toronto, Ontario, Canada, Elected Member 1923
Louis H. Fligman, M.D., Helena, Mont., Elected Member 1935
Alfred Friedlander, M.D., Cincinnati, Ohio, Elected Member 1926
Dr. Jos E. Germain, D.P.H., Rimouski, P. Q., Canada, Elected Member 1931
Drew R. Handley, M.D., Edinburg, Texas, Elected Member 1931
William F. Lunsford, M.D., Kansas City, Kansas, Elected Member 1934
John Ritchie, Malden, Mass., Elected Member 1912

Robert C. Robertson, Delhi, N. Y., Elected Member 1937
William H. Seemann, M.D., New Orleans, La., Elected Member 1933
Morris S. Wiener, D.D.S., Brooklyn, N. Y., Elected Member 1938
Adele E. Yoe, Louisville, Ky., Elected Member 1937

CORRECTION

An article by Leroy W. LaTowsky, M.D., appeared in the August *Journal*, beginning on page 912. The work reported therein was done in the Pathology Department of the University of Nebraska College of Medicine, under the direction of J. Perry Tollman, M.D., and E. L. McQuiddy, M.D., not at Dr. LaTowsky's present location—the Philadelphia General Hospital.

STANDARD METHODS
FOR THE EXAMINATION OF DAIRY PRODUCTS

SEVENTH EDITION, 1939

ERRATA

- Page 17* 4th paragraph, line 5, should read *contain* not *deliver*.
- Page 48* Legend for Fig. 14, interchange *right* and *left*. Legend for Fig. 15, last line, interchange *right* and *left*.
- Page 96* line 9 of 2. Plate Method. Change to read: containing crystal violet to a final dilution of 1:700,000.
- Page 115* Reaction Potato Dextrose Agar at time of pouring. Change to read: pH 3.5 ± 0.1 .
- Page 164* line 10. Delete: to avoid the later use of sodium carbonate. Insert: to avoid the formation of a precipitate.
- Page 167* under Reagents insert: (c) Sodium carbonate solution. Dissolve 140 gm. (1.32 molar solution) of pure anhydrous sodium carbonate in distilled water and make up to 1 liter.
- Page 168* line 11. Delete last sentence of second paragraph reading: Transfer 10 cc. of the filtrate, taken immediately after the filtration, into a test tube and heat in boiling water (kept boiling) for 3 minutes. Substitute: To 10 cc. of the filtrate add 2 cc. of the sodium carbonate solution, mix and heat in boiling water (kept boiling) for 2 minutes.
- line 19. Delete last sentence of 4th paragraph reading: Heat 10 cc. of this filtrate in a test tube in boiling water (kept boiling) for *exactly* 3 minutes. Substitute: To 10 cc. of the filtrate add 2 cc. of the sodium carbonate solution, mix and heat in boiling water (kept boiling) for 2 minutes.
- Page 169* line 22. Delete last sentence of 3rd paragraph reading: Transfer 10 cc. of the filtrate into a test tube, and place in boiling water (kept boiling) for 3 minutes. Substitute: To 10 cc. of the filtrate add 2 cc. of the sodium carbonate solution, mix and heat in boiling water (kept boiling) for 2 minutes.
- Page 172* line 4, line 7, and line 2 below table: It is understood in all A.O.A.C. reports that strengths of acid, when not otherwise specified, are those of the ordinary concentrated reagents.
- Page 174* line 2. Insert footnote: Recent work indicates that a phenol value of 0.05 mg. phenol per 0.5 cc. of sample generally indicates milk heated to 143° F., for 30 minutes (Gilcreas, *A.J.P.H.*, 29:158 (Feb.), 1939).
- Page 176* In heading of table at the bottom of the page, interchange the words yellow and red.
- Page 177* In heading of the table, interchange the words red and blue.

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge.

Replies to these advertisements, when keyed, should be addressed to the American Public Health Association, 50 West 50th Street, New York, N. Y., identifying clearly the key number on the envelope.

POSITIONS WANTED

HEALTH OFFICERS

Physician, experienced in health administration of cities and states, will consider attractive opening in maternal and child health or health education. A343

Experienced physician, administrator, epidemiologist, and teacher, now employed, with C.P.H. from Johns Hopkins, and 14 years' public health background, will consider position. Prefers epidemiology in city or state department. Excellent references. A355

Physician, aged 33; M.D., Minnesota; Dr.P.H., Johns Hopkins; has served as epidemiologist in large city and director of county health unit, with 7 years' public health experience; will consider position in public health administration or epidemiology. A432

Physician, aged 39; M.D. and Dr.P.H., Yale University; with excellent training in medicine, pediatrics, and epidemiology, now specializing in public health education, will consider appointment in health education or administration. A366

Physician, M.D., University of Cincinnati; with postgraduate training in venereal disease control, Johns Hopkins; now employed, is available as venereal disease control officer. A363

Physician, M.D., Syracuse University; M.P.H., Harvard; postgraduate studies in bacteriology and immunology, will consider position as health officer or epidemiologist. Has served as director of county health unit, director of industrial hygiene and medical statistics and venereal disease field survey officer. A305

HEALTH EDUCATION

Well qualified woman in health education wishes position as health coordinator or health counselor. Has wide experience, and Ph.D. from New York University. H236

Young woman, Ph.D., Columbia Uni-

versity, splendid background of experience in health education, will consider position as director of public health education. H294

Young woman, M.A., Health Education, Teachers College, Columbia; with splendid international experience, seeks position as director of health education. H369

Young woman, experienced teacher in health education, with M.S. in Public Health and Hygiene from University of Michigan, seeks position as health coordinator. H398

LABORATORY

Broadly experienced laboratory director with excellent background, now employed southern state, seeks responsible position in laboratory work or teaching of bacteriology, immunology, and pathology. L426

Capable research worker, Ph.D., trained at University of Southern California and Pasteur Institute, seeks position directing laboratory, in research work or field investigation. Has taught bacteriology, directed state hygiene laboratory and hospital laboratories. L315

MISCELLANEOUS

Experienced teacher in bacteriology and public health; Ph.D., Cornell; now professor in grade A medical school, will consider teaching, executive, or administrative position. M327

Dentist, graduate of Temple University, with excellent postgraduate experience, desires position in administrative aspects of dental hygiene. M352

Engineer with good training and experience in water treatment, sewage plant operation and in research, wishes position as superintendent. Can go anywhere. E422

Public health engineer, B.S. in Civil and Sanitary Engineering; C.P.H., University of North Carolina; 3 years' experience with state department of health

as field supervisor during which time he was in charge of shellfish sanitation; also experienced as district sanitarian; seeks position in public health engineering field. E430

Physician with postgraduate studies in public health at the University of Michigan, seeks employment in public health field. Has served in the Division of Maternal and Child Health of State Department, assistant director of a state health department, and state health commissioner. M309

Experienced director of milk control, food and sanitation and industrial hygiene. B.S. degree and well known

record directing such work in two major cities and one state. References prominent public health personalities. M434

Engineer with B.S. degree and drafting ability, and with U. S. Public Health Service experience in sanitation and malaria control, desires position in sanitation and general public health work. Can go anywhere. E433

Young woman statistician, B.S. in Education, University of Pennsylvania; M.S.P.H., University of Michigan; experienced as secretarial, research and statistical worker in school of public health, desires position in the public health field. S431

Situations Open

PUBLIC HEALTH PHYSICIAN—Southern rural district; physician sympathetic with missionary program preferred; woman eligible; \$2,700. 90-PH, Medical Bureau, Palmolive Building, Chicago.

STUDENT HEALTH PHYSICIAN—For appointment to student health staff in exclusive junior college for women; excellent training internal medicine required; M.S. or Ph.D. in addition to M.D. desirable; woman physician considered. 91-PH, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH PHYSICIAN—Young physician with good medical background, interested in obtaining public health training; salaried appointment at end of month in field; man of English, Irish, or Scotch ancestry preferred. 92-PH, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH PHYSICIAN—Capable and qualified to head department of maternal and infancy work on state board; East. 94-PH, Medical Bureau, Palmolive Building, Chicago.

STUDENT HEALTH PHYSICIAN—Co-educational college having 5 full-time physicians on student health staff; college hospital has 50 beds; opportunity for advancement; \$200; 9-month appointment. 93-PH, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—Interesting tuberculosis follow-up program including bedside nursing service; graduate nurse with both public health and tuberculosis experience preferred; \$115-\$120, plus \$20 car allowance; city of 40,000; North. 95-PH, Medical Bureau, Palmolive Building, Chicago.

SCHOOL NURSE—Large state teachers' college; duties involve actual health work with students; some teaching; \$900-\$1,100, maintenance; 10½ month appointment. 96-PH, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—Public health nurse, for school health service; Michigan. 97-PH, Medical Bureau, Palmolive Building, Chicago.

Situations Wanted

CERTIFIED PUBLIC HEALTH NURSE—B.S. in Education; M.S. in Public Health; experience includes teaching and directorship school of nursing, public health education and research; publications on topics related to public health problems; would like college teaching appointment including opportunity to complete few remaining hours for Ph.D. 98-PH, Medical Bureau, Palmolive Building, Chicago.

HEALTH EDUCATOR—A.B., physical education; M.S., public health; Ph.D., health education; desires appointment allowing full scope for exceptional preparation and experience; would consider opportunities in community hygiene, public health education, or position as health counselor or coordinator; at present serving as director health

education for national organization in large city. 99-PH, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH PHYSICIAN—B.S. and M.D. degrees eastern schools; C.P.H., Johns Hopkins School of Hygiene; 5 years chief epidemiologist state department of health. 910-PH, Medical Bureau, Palmolive Building, Chicago.

BACTERIOLOGIST—B.S., M.A. and Ph.D. degrees, state university, 10 years, teaching and research, including instructorship state laboratory of hygiene; would like research appointment in public health laboratory, or university teaching connection affording unusual research opportunities. 911-PH, Medical Bureau, Palmolive Building, Chicago.

NEWS FROM THE FIELD

NEW OFFICERS OF WESTERN BRANCH, A.P.H.A.

AT its Tenth Annual Meeting held recently in Oakland, the Western Branch of the A.P.H.A. elected the following officers to serve for the ensuing year.

President—Frederick D. Stricker, M.D., Portland, Ore.

President-Elect—W. P. Shepard, M.D., San Francisco, Calif.

Vice-President—James S. Cull, M.D., Victoria, B. C., Canada

Vice-President — Edith Kuhns, Helena, Mont.

Vice-President—I. O. Church, M.D., Oakland, Calif.

Secretary—W. Ford Higby, San Francisco, Calif.

Treasurer—Guy S. Millberry, D.D.S., San Francisco, Calif.

Chairman of Executive Committee—W. L. Halverson, M.D., Pasadena, Calif.

EDUCATION OF THE PUBLIC IN HEALTH

A NEW course, designed to train school supervisors, and especially supervisors of education in health, in the important technic of educating the public concerning the protection and promotion of health will be offered at the Harvard School of Public Health beginning in September.

The course, open to college graduates and extending one or two years, has been planned in recognition of the growing realization that those who are engaged in health education work must not only understand individual health measures, but they must also know what public health is, what its aims are, and what administrative measures are used in the fulfillment of its aims. Because it is equally essential that the student understand educational technics, the Harvard Graduate School of Education will coöperate with the Harvard School of Public Health in giving this new course.

There will be no prescribed curriculum; each student will be assigned a personal program after an individual conference to determine his or her needs, in the light of prior training and experience. Credit may be granted for previous academic work in public health and in educational methods, and for experience in the field.

The training offered in this course is based on the principle that the person going into the field of health education needs first of all a basic knowledge of anatomy, physiology, and the fundamental medical sciences. He will need to know the diverse functions of health departments and how such departments are organized. The student, will, therefore, according to his individual needs, be assigned to work in the Harvard School of Public Health, in the Harvard Graduate School of Education, in the Harvard Faculty of Arts and Sciences, in Radcliffe College and in the Harvard Medical School.

NEW YORK CITY HEALTH DEPARTMENT PROPOSES WIDE EXPANSION OF SERVICES

ON August 15, Dr. John L. Rice, Commissioner of Health of New York City, submitted to the City Planning Commission a capital budget for the period 1940-1945. For the Department of Health he proposes the construction of 14 health centers and 22 substations in the various boroughs at a cost of \$7,450,000. An additional request for \$300,000 to complete pending projects brings the total to \$7,750,000.

Before the same board, Dr. Thomas A. Gonzales, Chief Medical Examiner, asked for \$500,000 for an Institute of Forensic Medicine near Bellevue Hospital to train law and medical students in the investigation of crime and the presentation of evidence in courts.

NEW HEALTH OFFICER IN MICHIGAN

THE appointment of Henry Allen Moyer, M.D., of Charlotte, Mich., as State Health Officer, succeeding Don W. Gudakunst, M.D., Dr.P.H., was effective August 1.

CHIROPRACTOR CONVICTED

IT has been reported by George C. Ruhland, M.D., Health Officer of the District of Columbia, and Secretary of the Commission on Licensure of the Healing Arts Practice Act, that on July 27, I. Moton Johnson, a local chiropractor, was convicted of practicing medicine without a license and sentenced to 60 days in jail.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY ESTABLISHES PUBLIC HEALTH ENGINEERING COURSE

THE establishment, at the Massachusetts Institute of Technology, Cambridge, Mass., of a graduate course in public health engineering has been announced by Dr. Samuel C. Prescott, Dean of Science and head of the Department of Biology and Public Health.

The course, which will begin with the opening of the school year on September 25, will lead to the degree of master of science in one year, and will be open to qualified men of outstanding scholastic attainment and professional promise who are graduates in engineering of a recognized school or college. Candidates must have had at least one year of experience with a city, county, or state department of health, the U. S. Public Health Service, or some other recognized health agency.

Professor Murray P. Horwood, of the Department of Biology and Public Health, will direct the courses in public health engineering and vital statistics, while Professor T. R. Camp, of the Department of Civil Engineering, will give the course in hydraulic and sanitary engineering and sanitary de-

sign. The courses in health department practice and industrial hygiene will be given by Professor Clair E. Turner, and the course in sanitary biology by Professor Marshall W. Jennison. Students will be required to present a satisfactory thesis dealing with some original investigation.

JOHN RITCHIE

JOHN RITCHIE, of Malden, Mass., Charter Fellow of the American Public Health Association, Health Commissioner of the City of Boston 1908-1910, died suddenly on July 22, at the age of 88. Mr. Ritchie was for 23 years in charge of the collection and distribution of news on astronomy from Harvard for the United States Government. He had one of the largest libraries in the world on conchology, and a famous collection of shells.

He was Associate Editor of the *American Journal of Public Health*, under Dr. Arthur W. Hedrich, from December, 1919, to September, 1921.

He was a fellow and one-time president of the Boston Scientific Society, a member of the Massachusetts Statistical Association, the Massachusetts Charitable Merchants Association, Malden Tuberculosis Association, Boston Malacological Society, and a fellow of the American Meteorological Society.

PERSONALS

Central States

DR. CARLE W. BEANE, of West Manchester, Ohio, has been appointed Health Commissioner of Preble County, succeeding Dr. JAMES I. NISBET, of Eaton, resigned. DR. GERALDINE M. H. CROCKER, of Granville, Ohio, has been appointed Health Commissioner of Licking County.

† Member A.P.H.A.

THOMAS E. EYRES, M.D.,† of Des Moines, Ia., the first director of the Polk County Health Unit, organized August 18, 1937, has resigned to engage in private practice.

DR. CHESTER S. HEIMLICH, of Attica, Ohio, has been appointed Health Officer of Seneca County.

DR. IRVIN B. KIEVIT, of Medina, Ohio, recently resigned as Health Commissioner of Medina County.

DR. LLOYD E. OVERHULSE, of Holgate, Ohio, has been appointed Health Commissioner of Henry County, to succeed JULIUS R. BOLLES, M.D.,† of Napoleon.

HARRY WAIN, M.D.,† formerly of Chicago, has been appointed Health Officer of Sidney and Shelby County, Ohio.

Eastern States

DR. RALPH S. BELMONT, formerly Associate Medical Officer, U. S. Veterans' Administration, West Los Angeles, Calif., has been appointed Health Officer of Sanford, Me.

DR. ROBERT E. ELLEGOOD, of Dover, Del., who has been a member of the State Board of Health for 23 years, has resigned.

ARTHUR C. JOST, M.D.,† of Dover, Del., has resigned as Executive Secretary of the State Board of Health, effective August 10.

Southern States

DR. BENJAMIN R. ALLEN, of Chatham, Va., formerly Health Officer of the Pittsylvania Valley District, has been appointed Health Officer of the Suffolk-Nansemond-Isle of Wight District, succeeding DR. THOMAS SCARLETT.

GEORGE M. ANDERSON, M.D.,† of Morgan, Ga., has been the Health Officer of the Calhoun County, Ga.,

Health Department. It was recently decided to dispense with this Department, for economic reasons.

JOHN B. H. BONNER, M.D.,† has been transferred as Health Officer from Prince George County to the Page-Shenandoah-Warren Health District, with headquarters at Luray, Va.

DR. PAUL W. BOWDEN, of Franklin, Va., has been appointed Health Officer of Southampton County, succeeding the late PETER P. CAUSEY, M.D.,† of Courtland.

DR. WESLEY G. BYERLY, of Statesville, N. C., has been appointed Health Officer of the Burke-Caldwell District Health Department, succeeding WARREN D. CARTER, M.D., C.P.H.,† of Morganton.

GEORGE R. CARPENTER, M.D.,† formerly of Bristol, Va., has been appointed Health Officer of Fairfax County, to succeed EDWARD M. HOLMES, JR., M.D.,† now on the staff of the State Health Department.

FRANCIS J. CLEMENTS, M.D.,† of Stony Creek, Va., has been transferred as Health Officer from Sussex County to the Sussex-Prince George Health District, with headquarters at Stony Creek.

DR. ANDREW B. COLLEY, of Tompkinsville, Ky., has been appointed Health Officer of Webster County, to succeed DR. CHARLES M. SMITH, of Dixon, resigned.

HERMAN F. EASOM, M.D.,† of Raleigh, N. C., has resigned as Director of the Division of Industrial Hygiene of the State Board of Health. He will return to the staff of the North Carolina Sanatorium for the Treatment of Tuberculosis, where he was formerly located.

WILLIAM W. FULLER, M.D.,† of Williamsburg, Va., has been appointed Director of the Peninsula Health District, to succeed JACK B. PORTERFIELD, M.D.,† who has joined the

† Member A.P.H.A.

- State Health Department in Richmond.
- ISBIN S. GIDDENS, M.D.,† formerly of Ray City, Ga., has been appointed Health Commissioner of Jenkins County, with headquarters in Millen, succeeding Dr. GLENN J. BRIDGES, resigned.
- DR. ROBERT N. GRAHAM, of Del Rio, Tex., has been appointed Health Officer of Val Verde County.
- DR. LELAND J. HANCHETT, Passed Assistant Surgeon, U. S. Public Health Service, has been placed in charge of the Division of Venereal Disease Control of the Florida State Board of Health, relieving Dr. LEO C. GONZALEZ, of Jacksonville, while he is taking a postgraduate course in venereal disease control and public health at Johns Hopkins University School of Hygiene and Public Health, Baltimore, Md.
- DR. OLIVER W. JENKINS, of Edison, Ga., has been named Health Commissioner of Bartow County, succeeding Dr. ROBERT F. YOUNG, of Cartersville, who resigned to enter general practice in Hope, Ark.
- DR. DANIEL E. LITTLE, of Eufaula, Okla., has been appointed Health Superintendent of McIntosh County.
- DR. JOE W. MAY, of Donna, Tex., was elected Health Officer of Hidalgo County, to succeed the late DREW R. HANDLEY, M.D.,† of Edinburg.
- ALBERT B. MCCREARY, M.D.,† of Jacksonville, Fla., has been appointed Health Officer of Florida, succeeding the late WILBUR A. MCPHAUL, M.D.† Dr. McCreary has been Director of the Bureau of County and District Health Work for the State Board of Health during the past 4 years.
- DR. CHARLES W. McDONALD, of Marianna, Fla., District Health Officer, has been named Acting Health Officer, following the resignation of
- DR. RAYBURN N. JOYNER as Director of the Jackson County Health Department.
- CHRISTOPHER L. MENGIS, M.D.,† of New Orleans, La., formerly Director of the Crippled Children's Division of the Louisiana State Board of Health, has been appointed Director of the Iberia Parish Health Unit, with headquarters at Homer, La., succeeding BERT L. STINSON, M.D.†
- DR. LAILOR A. MORROGH, JR., of Arnaudville, La., has been appointed Director of the Avoyelles Parish Health Unit, succeeding the late LUCIUS W. HOLLOMAN, M.D.,† of Marksville.
- JOHN C. NEALE, JR., M.D.,† of Staunton, Va., has resigned as Health Officer of Augusta County, to take charge of the Southwest District, with headquarters at Abingdon.
- DR. WALDO B. NEWELL, JR., of Enid, Okla., was appointed Superintendent of Health of Garfield County, effective April 1, succeeding the late Dr. WILLIAM W. GILL, of Enid.
- CHARLES M. PEARCE, M.D.,† formerly State Health Commissioner of Oklahoma, has been appointed Health Officer of Lake County, Fla., succeeding Dr. TERRY BIRD. His headquarters will be in Tavares.
- CARL V. REYNOLDS, M.D.,† of Raleigh, N. C., has been reappointed State Health Officer for another term of 4 years. He was first appointed Acting Health Officer in November, 1934, on the death of Dr. JAMES M. PARROTT, and received the regular appointment in May, 1935.
- DR. CHESTER L. RILEY, of Manassas, Va., has been transferred as Health Officer from Prince William County to the Prince William-Stafford Health District, with headquarters at Manassas.
- WYATT E. ROYE, M.D.,† formerly of Richmond, Va., has been assigned to the Alleghany-Botetourt District,

† Member A.P.H.A.

with offices in Covington. He is succeeding JAMES H. GORDON, M.D.,† who has resigned to take graduate work in Philadelphia.

HARRY A. SAUBERLI, M.D.,† of Sevierville, Tenn., has been appointed Health Officer of the Upper Cumberland District, to succeed FRAY O. PEARSON, M.D.,† resigned.

DR. THOMAS SCARLETT, formerly Health Officer of the Suffolk-Nansemond-Isle of Wight District, in Virginia, has been assigned to the Rockingham County Health District, with headquarters in Harrisonburg.

DR. FRANK KASH SEWELL, of Madisonville, Ky., has been appointed Health Officer of Breathitt County.

BERT L. STINSON, M.D.,† of Homer, La., has succeeded DR. WALTER W. POIMBOEUF as head of the Health Service in Claiborne Parish.

VAN C. TIPTON, M.D.,† of Austin, Tex., has been appointed Director of Public Health for San Antonio.

THOMAS B. TURNER, M.D.,† of the International Health Division of the Rockefeller Foundation, has been appointed Professor of Bacteriology at the Johns Hopkins University School of Hygiene and Public Health, Baltimore, Md. During the past 3 years Dr. Turner has been engaged in postgraduate teaching and research in syphilis at the School of Hygiene and Public Health, under the auspices of the Foundation.

VERNON A. TURNER, M.D.,† of Richlands, Va., has been appointed as Health Officer of Augusta County, succeeding JOHN C. NEALE, JR., M.D.,† resigned. Dr. Turner was formerly in charge of the Buchanan-Russell-Tazewell District.

DR. CLARENCE H. WHITE, of Newton, N. C., has resigned as Health Officer of Catawba County. Dr. White will study at Harvard University.

† Member A.P.H.A.

Western States

KATHERINE KING BAKER,† formerly employed with the New Mexico State Department of Health, is now employed as Supervisor of Nurses, City Health Department of San Antonio, Tex.

EDWARD J. DEHNE, of Kellogg, Idaho, has been appointed Health Officer of Clatsop County, Ore., succeeding LENOR S. GOERKE, M.D., C.P.H.†

DR. FRANCIS H. GAMBELL, of Willows, Calif., has been appointed Health Officer of Glenn County, succeeding DR. FRANK M. LAWSON.

LENOR S. GOERKE, M.D., C.P.H.,† of Astoria, Ore., recently Health Officer of Clatsop County, has been appointed Health Officer of Yamhill County.

HAROLD R. HENNESSY, M.D.,† has been appointed Bi-County Health Officer of Sutter and Yuba Counties, Calif. He recently completed a year of post-graduate work in Public Health at the University of California.

DR. CORNELIUS W. LANE, of Crescent City, Calif., has been named to succeed DR. WILSON STEGMAN as Health Officer of Del Norte County.

DR. FRANK I. O'NEILL, of Oroville, Calif., has resigned as Health Officer of Butte County.

DR. ALFRED C. REED, the Director of the Institute of Tropical Medicine of the University of California, has been elected a corresponding member of the Belgium Society of Tropical Medicine.

DEATHS

WILBUR A. MCPHAUL, M.D.,† State Health Officer, of Jacksonville, Fla., died August 1.

DR. WILLIAM J. MAYO, of the Mayo Clinic, Rochester, Minn., died July 28.

CONFERENCES AND DATES

- American Association for the Advancement of Science. Annual Meeting—Columbus, Ohio, December 27, 1939–January 2, 1940.
- American Congress of Physical Therapy. Hotel Pennsylvania, New York, N. Y. September 5–8. (Following Seminar in Physical Therapy for Physicians and Technicians, August 30–September 2.)
- American Association of Railway Surgeons. Chicago, Ill. September 11–13.
- American Congress on Obstetrics and Gynecology—sponsored by the American Committee on Maternal Welfare, Inc. Municipal Auditorium, Cleveland, Ohio. September 11–15.
- American Public Health Association. 68th Annual Meeting. Hotel William Penn, Pittsburgh, Pa. October 17–20.
- American Public Welfare Association. Round Table and Annual Meeting. Washington, D. C. December 6–10.
- American Public Works Association. Pittsburgh, Pa. October 9–11.
- American Roentgen Ray Society. Chicago, Ill. September 19–22.
- American School Health Association. Hotel William Penn, Pittsburgh, Pa. October 16–20.
- American Society of Civil Engineers—Fall Meeting. New York, N. Y., September 4–9.
- American Standards Association. New York, N. Y. December 13.
- American Statistical Association—Annual Meeting. Philadelphia, Pa. December 27–30.
- Association of Dairy, Food and Drug Officials of the United States—43rd Annual Conference. Hartford, Conn. September 26–29.
- Association of Women in Public Health. Century Club, Pittsburgh, Pa. October 16.
- Biological Photographic Association—9th Annual Convention. Mellon Institute for Industrial Research, Pittsburgh, Pa. September 14–16.
- California Sewage Works Association—12th Annual Fall Convention. Oakland, Calif. September 18–19.
- Civil Service Assembly of the United States and Canada. San Francisco, Calif. October 16–20.
- Civil Service Assembly—Western Regional Conference. San Francisco, Calif. October 17.
- Colorado Public Health Association. Colorado Springs, Colo. October 3–4.
- Convention for the Revision of the Pharmacopoeia of the United States. Washington, D. C. May 14, 1940.
- Directors of Local Health Services Conference. Hotel Roosevelt, Pittsburgh, Pa. October 16.
- Florida Public Health Association. Jacksonville, Fla. December 7–9.
- Health Education Institute—American Public Health Association, Annual Meeting. Hotel William Penn, Pittsburgh, Pa. October 15–17.
- Institute for the Consideration of the Blood and Blood-forming Organs. University of Wisconsin Medical School, Madison, Wis. September 4–6.
- International Association for Identification. Tulsa, Okla. September 11–14.
- International Association of Milk Sanitarians, Inc.—Annual Meeting. New Hotel Mayflower, Jacksonville, Fla. October 25–27.
- International Cancer Congress—Third. Haddon Hall Hotel, Atlantic City, N. J. September 11–16.

- International Congress of Microbiology—Third. Waldorf-Astoria Hotel New York, N. Y. September 2-9.
- International Heating and Ventilating Exposition—Sixth. Under auspices of the American Society of Heating and Ventilating Engineers, and coinciding with its 46th Annual Meeting. Lakeside Hall, Cleveland, Ohio. January 22-26, 1940.
- International Society of Medical Health Officers. Hotel William Penn, Pittsburgh, Pa. October 16.
- Michigan Public Health Association. Grand Rapids, Mich. November 8-10.
- Mississippi Public Health Association. Jackson, Miss. December 6-8.
- Municipal Public Health Engineers Conference. Hotel William Penn, Pittsburgh, Pa. October 16.
- National Association for Nursery Education—Biennial Meeting. Hotel Pennsylvania, New York, N. Y. October 25-28.
- National Association of Housing Officials. New Orleans, La. November 22-24.
- National Association of Public School Business Officials. Cincinnati, Ohio. October 16-20.
- National Association of Sanitarians. Oakland, Calif. December.
- National Organization for Public Health Nursing. Hotel William Penn, Pittsburgh, Pa. October 15-16.
- National Pest Control Association—7th Convention. Hotel Pennsylvania, New York, N. Y. October 23-25.
- National Recreation Congress—24th. Boston, Mass. October 9-13.
- National Safety Congress and Exposition—28th. Atlantic City, N. J. October 16-20.
- National Society for the Prevention of Blindness. Annual Conference. Hotel Astor, New York, N. Y. October 26-28.
- National Warm Air Heating and Air Conditioning Association. Cleveland, Ohio. January 22-26, 1940.
- New Jersey Health and Sanitary Association—65th Annual Meeting. Berkeley-Carteret Hotel, Asbury Park, N. J. November 24-25.
- New York State Sewage Works Association. Olean House, Olean, N. Y. October 6-7.
- Pan-Pacific Surgical Association—Third Congress. Honolulu, T.H. September 15-28.
- Pennsylvania Public Health Association—Meeting with American Public Health Association. Hotel William Penn, Pittsburgh, Pa. October 18.
- Rocky Mountain Medical Conference. Salt Lake City, Utah. September 5-7.
- Southern California Public Health Association. Long Beach, Calif. January 24, 1940.
- State, County, and Municipal Workers of America. New York, N. Y. September 27-30.
- State Laboratory Directors Conference. Hotel William Penn, Pittsburgh, Pa. October 16.
- State Sanitary Engineers Conference. Hotel William Penn, Pittsburgh, Pa. October 16-17.
- Texas Public Health Association. Galveston, Tex. October 2-4.
- Tri-State Food & Health Officials. Hotel William Penn, Pittsburgh, Pa. October 18.
- West Virginia Public Health Association. Hotel Fairmont, Fairmont, W. Va. November 6-8.
- Western Governmental Research Association. Palo Alto, Calif. October 13-15.

Canada

- British Columbia Medical Association. Hotel Vancouver, Vancouver, B. C. September 18-21.
- International Hospital Association. Toronto, Ont. September 19-23.
- American College of Hospital Adminis-

COLLEGE OF

trators. Toronto, Ont. September

24-25.

American Hospital Association. Toronto,
Ont. September 25-29.

Foreign

International Conference on Sewage
Works and Disposal. Glasgow, Scot-
land. September 12-18.

Intergovernmental Conference of Ameri-
can Countries on Rural Hygiene.
Mexico City, Mexico. End of 1939
(postponed from November 10,
1938).

International Management Congress.
Stockholm, Sweden. September 19-
23, 1941.

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Viruses of Equine and of St. Louis Encephalitis in Relationship to Human Infections in California 1937-1938

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DURING the summer and autumn of 1937, physicians in California reported a number of cases of acute encephalitis, some with a stormy course and others less violent. There were 40 deaths. Most of the cases occurred in the two large Central California Valley regions with the majority from Fresno and Tulare Counties. Fresno reported 13 fatalities, while a milder form, usually with uneventful recovery, occurred in Tulare. During the same seasonal period in 1938 a similar type of disease was recorded showing both the severe and the milder forms. Fresno and Tulare were again affected, with additional patients from Kern County at the extreme southern end of the San Joaquin Valley.

During 1937 brain material was received from 3 fatal cases but although numerous mice and a number of monkeys were inoculated, no virus was recovered. Sera were then collected

through the coöperation of the Fresno and Tulare County Health Departments from many of the recovered patients in the lower San Joaquin Valley districts where the outbreak was the most severe. Sera were also obtained in connection with the State Department of Public Health from other regions in California where some form of encephalitis had been reported. The clinical history of this group¹ has been reported, so this paper will not bear upon that aspect.

It was found that about 56 per cent of the recovered patients in the Fresno and Tulare areas had neutralizing antibodies for the virus of St. Louis encephalitis,² while they were negative for the Japanese B virus and that of lymphocytic choriomeningitis (l.c.m.).*

* These viruses were kindly sent as follows: The Japanese B strain from Dr. S. Kashara of the Kitasato Institute, the St. Louis virus from Dr. L. T. Webster of the Rockefeller Institute, and that of the l.c.m. strain from Dr. C. Armstrong of the National Institute of Health.

Since many of these cases showed clinical pictures similar to those described for the St. Louis type of encephalitis, it was assumed up to and through part of the summer of 1938 that the etiological agents were identical even though no virus had been directly isolated. However, the percentage of positive neutralization tests given seemed much lower than those reported by other workers for sera of recovered cases after the St. Louis outbreak. Wooley and Armstrong³ obtained 94 per cent positive sera from 39 convalescent patients; Webster, Fite, and Clow⁴ 82.5 per cent from 29, and later Muckenfuss, Smadel, and Moore⁵ found 69 per cent definitely positive and 9 per cent doubtfully positive of 126 sera tested from recovered encephalitic patients in the vicinity of St. Louis.

This discrepancy was not easily accounted for at the time and it was not until the autumn of 1938 that it was explained by recovery of the western strain of equine encephalomyelitic virus from the brain of a child at Fresno.⁶ This was followed by isolation of the same type of virus from the blood of a man in Tulare.⁷ With the knowledge that another neurotropic virus could be a responsible agent in this region additional studies were undertaken to determine the extent of the disease in reported encephalitic areas and to ascertain whether a differentiation could be made.

NEUTRALIZATION TESTS WITH HUMAN SERA

During the autumn of 1937 and the first half of 1938, sera were collected from recovered encephalitic patients in the Central California Valley areas exclusive of Kern County, and from a few coastal towns. These sera were mainly from Fresno and Tulare Counties and were tested for antiviral substances against the l.c.m., the St. Louis, and the Japanese viruses, respectively.

A certain number were also used against the poliomyelitic virus. After recovery of the human equine strains, tests were made against the new, very virulent Br variety with all the old sera available from these areas and with more sera collected later in 1938 from Kern and Fresno Counties.

Protection experiments for the encephalitic viruses were performed as follows: Equal parts of serum and the appropriate dilutions of each virus were mixed and held overnight in the refrigerator before inoculating 0.03 cc. intracerebrally into mice. After preliminary titrations and stabilizing of each virus, it was found that under the conditions given the following dilutions were the most advantageous for each type, 2 being employed for each strain and from 3 to 4 mice per serum for each dilution of virus. The dilutions for the encephalitic viruses were made from 10 per cent brain suspensions in a mixture of equal parts of broth (pH 7.5) and sterile distilled water. They were 1-10,000 and 1-50,000 for the St. Louis strain, 1-50,000 and 1-100,000 for the Japanese B, 1-100 and 1-250 for the l.c.m., and 1-1,000,000 and 1-5,000,000 for the Br human equine virus. The original western equine (California) strain was used in the dilutions of 1-10,000 and 1-100,000. Known negative and positive sera were always included with each series. Equal parts of serum and a 1-25 dilution of the 5 per cent poliomyelitic virus were also mixed and kept overnight in the cold before inoculating 1.5 cc. intracerebrally into rhesus monkeys.

Forty-nine, or 47.5 per cent, of 103 sera of the encephalitic group had protective antibodies against the St. Louis strain, although 10 were only weakly positive as shown in Table I. A serum was considered to give a positive neutralization if all the mice employed remained alive for the two dilutions, and weakly positive if they died with

TABLE I
Neutralization Tests on Sera of Encephalitic Cases*

County	No. Cases Tested	Strains of Virus				Positive for Both Types of Virus
		Western Equine Virus (Br Strain)	No. Cases Tested	St. Louis Encephalitis Virus	No. Cases Tested	
Fresno 1936-38	19	3 ⊕ 9 +	23	1 ⊕ 9 +	20	7
		12 (63.1%) +		10 (43.4%) +		7 (35%) +
Kern 1938	26	1 ⊕ 8 +	26	5 ⊕ 8 +	26	5
		9 (34.2%) +		13 (50.0%) +		5 (19.2%) +
Tulare 1937-38	14	1 ⊕ 4 +	22	2 ⊕ 12 +	14	4
		5 (35.7%) +		14 (63.67%) +		4 (28.5%) +
San Joaquin 1937-38	4	2 +	7	3 +		
		2 (50%) +		3 (42%) +		
Other Central Valley areas 1937-38	9	1 ⊕ 3 +	11	1 ⊕ 5 +	9	2
		4 (44.4%) +		6 (54.4%) +		2 (22.2%) +
Coastal Areas 1937-38	14	0	14	1 ⊕ 2 + 3 (21.4%) +		
Total No.	86	32 (37.0%) +	103	49 (47.5%) +	69	18 (26%) +

* ⊕ = Weakly positive neutralization
+ = Positive neutralization
0 = No neutralization

the strong dilution and survived the weaker. They were negative if all animals died.

Seventy-one of the 103 sera were from cases in the 3 counties of Kern, Tulare, and Fresno, in the lower San Joaquin Valley where the majority of the encephalitic reports occurred; 37 of the 71 sera, or 52.1 per cent, gave some degree of positive protection for the St. Louis virus, the largest number coming from Tulare County and the next from Kern County. There were 2 positive cases and 1 weakly positive from the coastal counties.

Of 86 sera tested from individual cases, 32, or 37.0 per cent, gave either a weakly or a strongly positive neutralization against the Br strain of equine virus: 59 of these came from the 3 designated counties with 26, or 44 per cent, positive. These figures undoubtedly would have been higher if material had been obtained from all the patients showing neurotropic symptoms.

Unfortunately many of the earlier cases disappeared and blood could not be obtained later when the importance of the equine virus for man was ascertained.

There were 6 positive neutralizations with sera from other areas in the more central or the northern parts of the Valley regions and none from the coastal districts (Table I).

That so many sera showed protection tests for these two viruses was probably of some diagnostic significance, but just how much reliance can be placed in such findings may be questioned when on further analysis it was found that a number of sera were positive to both the St. Louis and the equine strains. Of 69 sera tested against the two types, 18, or 26 per cent, showed some degree of neutralization for both (Table I).

To add further to the uncertainty in regard to the value of the neutralization test in these neurotropic cases, 34 sera of the earlier encephalitic series,

which did not include the Kern County group, were tested for antiviral substances against the virus of poliomyelitis; 26, or 78.7 per cent, of these were positive but only 4 to this virus alone. Four were positive only to the St. Louis strain while 12 had antibodies for both viruses. Thirteen of these sera remained and later 2 were found to neutralize the equine strain. There was sufficient evidence, therefore, that, given a certain district, the human serum could harbor antiviral substances for a variety of neurotropic viruses.

From 1934 to 1937 many cases of central nervous system disturbances were reported by physicians from both Kern and Tulare Counties, mainly recorded as poliomyelitis. Many of these people showed only a transient muscular weakness and recovered without residual paralysis. Fresh serum was obtained from 14 of these individuals in Kern County who had been diagnosed as having poliomyelitis in 1934 to 1937 respectively. Five were positive for the St. Louis virus, 6 for the equine, and 3 for both. Taken by years, one of the 4 sera in the 1934 group was positive for the St. Louis strain and none for

the equine. The 2 in the 1935 group showed some neutralization for both viruses, while of the 4 in 1936, 1 serum neutralized the equine and 2 were positive for the St. Louis type. In the 1937 series 3 of the 4 sera reacted to the equine and none to the St. Louis strain.

Some old sera were available from a poliomyelitic group in Tulare County who had been bled in 1936 and 1937, respectively. One person showed clinical symptoms in 1934 and another in 1937, but the majority were ill during 1935 and 1936. Sera from 23 of these individuals were tested in 1938 against the St. Louis virus and 11 (43.4 per cent) showed a positive neutralization, as given in Table III. Sixteen out of 20 (80.0 per cent) neutralized the virus of poliomyelitis, 8 being positive to it alone, and 6 positive to both the latter and the St. Louis strain (Table II). Only 13 of these sera remained that could be tested later against the Br equine virus. One showed a weakly positive reaction while all the others were negative. Most of the sera had been kept for 2 years in the refrigerator, so that it was interesting to note that the antiviral substances to the St. Louis

TABLE II
Neutralization Tests on Different Groups of Individuals

A.					B.				
Normal Individuals					Cases Diagnosed as Poliomyelitis				
Neutralization Test					Neutralization Test				
Type	No. Tested	Equine Virus (Br)	St. Louis Virus	Equine and St. Louis	Region	No. Tested	Equine Virus (Br)	No. St. Louis Tested	Equine and St. Louis
Normal non-contacts	26	0	2 + (7.6%)		Tulare County	13	1 + (7.6%)	23	11 + (43.4%)
Normal contacts	26	0	0		Kern County	14	6 + (42.8%)	14	5 + (35.7%)
Normal contacts in Tulare County	11	1 + (9.0%)	6 + (54.5%)	2 + to both (18.1%)	Bay areas	20	0	23	0
Total No.	63	1 + (1.5%)	8 + (12.6%)	2 + to both (3.0%)	Total No.	47	7 + (14.8%)	60	16 + (26.0%)
									4 + to both (6.6%)

+ = Positive neutralization test
0 = No neutralization

strain still remained. None of the people with sera positive to the St. Louis virus showed any residual paralysis and all had the onset since 1934. Of the negative cases 5 had some paralysis but had generally recovered. One in the group diagnosed in 1923 had residual paralysis and his serum did not neutralize the St. Louis strain.

In order to determine to what extent the antiviral substances for these viruses might be present among groups of people such as normal contacts, normal non-contacts, and recovered poliomyelitic patients from other than the Central Valley areas, various people were bled and their sera tested for antibodies.

In a group of recovered poliomyelitic cases from around the Bay Region, 23 sera failed to neutralize the St. Louis virus while 20 were negative to the Br equine strain (Table III). Most of the convalescents showed some form of residual paralysis, although 4 or 5 were apparently normal.

Of 26 normal non-contacts (Table III) including nurses, doctors, and laboratory workers in the Bay Region, none gave any neutralization for the equine strain. One was weakly and another strongly positive for the St. Louis virus. The former was a dentist in close contact with many people and the latter had lived in Kern County before training as a nurse in San Francisco.

A similar number of sera were tested from a group of normal individuals, doctors and nurses in the Valley areas who had had some contact with human encephalitic cases during the past few years, including also a group of veterinarians who had histories of previous contact with sick horses. All were negative to both viruses.

Another small group was included from Tulare County. These people had all been associated in some way with S, the man from whose blood the equine

virus had been recovered. Although one of the 11 sera was positive to the latter strain, 6 showed neutralization for the St. Louis virus, indicating contact to the latter among the general population in this region. No history was obtained from the person positive to the equine strain.

To summarize, it would appear that of a total of 63 apparently normal individuals as far as encephalitis was concerned, 8 had neutralizing antibodies for the St. Louis virus and 1 for the equine. All but 1 of the 9 had lived in the San Joaquin Valley. Of 47 tested for the equine virus, and 60 for the St. Louis strain among groups of people diagnosed as having had poliomyelitis, the only positive sera for either virus were from those residing in the San Joaquin Valley.

To confirm further the neutralization experiments on certain of the sera that were positive to the Br or new human equine strain, the tests were repeated using the original western equine (Californian) virus. Fourteen of the 21 sera, 16 of which are given in Table IV, were also strongly positive to this strain, 4 others were only weakly positive, although they had been stronger with the Br strain, while 3 were negative. The latter had reacted only very slightly to the Br virus so the amount of the antibodies could not have been very appreciable. Six sera negative to the human strain were also negative to the Californian variety. On the whole, however, the relationship between the two types of virus seemed fairly well established by this cross-neutralization with sera from cases having a history of some disturbance of the central nervous system.

No protective substances for the l.c.m. and the Japanese B viruses, respectively, were demonstrated in any of the sera of the 1937 series. These tests were discontinued for the group collected later.

TABLE III
Cases Positive to Western Equine Encephalomyelitis Either by the Presence of Virus or by the Neutralization Test

Name	County	Location	Date of Onset	Period from Onset to Bleeding	Neutralizations			Age in Years	Main Symptoms	Results	Remarks
					Equine (Br)	Equine (Calif.)	St. Louis				
L.M.	Kern	Bakersfield	7-22-35	3 yrs. 2 mos.	weakly +	+	+	27	headache, dizziness, muscle weakness	recovered	Native of California
K.M.	"	"	7-28-35	3 yrs. 2 mos.	+	+	weakly +	26	headache, vertigo, fever	recovered	Native of California
J.D.	"	"	Oct., 1937	1 yr.	+	+	0	11	headache, general malaise	recovered	Native of California
I.MacP.	"	"	Dec., 1937	10 mos.	weakly +	+	0	43		recovered	Came from Montana 5 years ago
L.M.	"	"	7-18-38	2 mos.	+	+	0	1	nausea, vomiting, stiff neck, drowsiness, muscle spasms	improved	
C.S.	"	"	7-7-37	1 yr. 3 mos.	+	slt. +	0	17	headache, fever, vomiting, drowsiness, muscle weakness	recovered	Born in Oklahoma
E.D.	"	Farm near Bakersfield	7-22-38	26 days	+	+	weakly +	26	headache, fever, drowsiness	recovered	
B.W.	"	Buttonwillow	7-27-38	21 days 2 mos.	++	+	0	1	fever, drowsiness, convulsions	constant convulsions, improved	Parents from Oklahoma
H.B.	"	Buttonwillow	9-13-38	1 week 1 month	++	+	weakly +	17	headache, vomiting, stiff neck, drowsiness	recovered	Oklahoma in 1936
J.B.	"	Kern Lake	8-2-38	7 weeks	++	+	0	4	headache, fever, vomiting, drowsiness	recovered	Lived in a tank house
J.K.	"	Edison Cabins	8-30-38	3 weeks 2 mos.	++	+	0	5 mos.	fever, irritable, muscle spasms, eyes affected	residuals, improved	Supposed to have had St. Louis type in Missouri 1936
C.R.	"	Poso	Aug., 1936 and Aug., 1938	2 mos. 10 weeks	++	weakly +	+	24	double vision, nervous, irritable, drowsiness	nervous but recovered	
R.T.	"	Delano	10-21-38	5 days 3 mos.	0 +	+	++	28	headache, fever, drowsiness, generalized muscle tenderness, stiff neck	recovered	
D.W.	"	Arvin	8-9-38	5 weeks 1 mo. 11 days	++	+	0 0	20	headache, vomiting, stiff neck, nausea, lethargy	recovered	Lived on a farm

J.B.	Fresno	Fresno	8-25-38	5 days				20 mos.	fever, irritability, rigidity of extremities, spasms of foot muscles, coma	died in 5 days	Virus of equine enceph. found in brain
G.L.	"	"	7-27-38	8 days 22 days	weakly + +	+	+	13	headache, dizziness, vomiting	recovered	
D.P.	"	5 miles from Fresno	8-1-37	1 yr. 1 yr. 2 mos.	++ ++	+	0	4	headache, vomiting, semi-comatose, irrational, general spasticity	residuals	
M.R.	"	Out from Fresno	10-13-38	15 days 25 days	++ +	+	weakly +	21	headache, vomiting, chills, sore throat, weakness of extremities	recovered	
H.L.	"	Fresno	8-2-38	2½ mos.	weakly +	0	+	50	chills, fever, headache, drowsiness	recovered	Lived near the slaughter house
J.H.	"	Kerman	9-22-38	12 days	+		0	17	drowsiness, muscular pain, rigid extremities, sore throat	recovered	
J.G.	"	Kerman	8-6-37	2 mos.	+	weakly +	0	66	headache, lethargy, stiff neck	recovered but weak	Serum kept over 1 year
F.H.	"	Selma	7-29-38	1 yr. 3 wks. 1 yr. 5 mos.	++ weakly +	weakly +	+	30	vomiting, headache, severe stiff neck, lethargy	recovered	
A.K.	"	Sangar	8-29-36	1 yr. 2 mos. 2 yrs.	++ weakly +	+	+	33	headache, fever, drowsiness	recovered	
C.T.	"	Sangar	7-27-38	8 days 22 days	0 +		+	35	stiff neck, muscle weakness, comatose, fever	recovered	
E.W.	"	"	9-27-38	2 mos. 1 mo.	weakly + +	+	0	16	headache, vomiting, fever, malaise, lethargic and very drowsy	recovered	Worked on a farm, many mosquitoes present
C.S.	"	Del Rey	8-21-37	1½ mos. 1 yr. 2 mos.	++ +	+	0	46	headache, fever, drowsiness	recovered	
Mrs.E.	Tulare	Rural	7-9-37	3½ mos.	weakly +		0	38	headache, fever, unconscious, lethargy	recovered	
A.J.	"	Strathmore	8-24-37	3¼ mos.	+		+	60	headache, drowsiness, fever, unconscious	recovered	
J.H.	"	"	9-15-37	3 mos. 1 yr. 1 mo.	++ +	+	+	52	headache, lethargy, generalized weakness	recovered	
R.McD.	"	Terra Bella	8-20-37	4 mos. 1 yr.	+		+	28	headache, fever, stiff neck, lethargy, spasticity	recovered	
V.S.	"	Kaweaha River	7-30-38	7 days					headache, malaise, drowsiness, stiff neck, in coma	died in 7 days	Virus in the blood

PERSISTENCE OF ANTIVIRAL SUBSTANCES

It is interesting to note that so far, with one exception, the antiviral substances to the Br equine strain appeared only in sera from individuals having had some definite disturbance of the central nervous system, either a recognizable encephalitis or some intermediate form difficult to distinguish from poliomyelitis. The one exception was in a person who had been in contact with a known case of human equine encephalomyelitis and lived in an apparently infected area, but whose earlier history was not ascertained.

On the other hand, antibodies for the St. Louis virus were found not only in those people with some neurological disturbance but from a certain number of apparently normal individuals, indicating perhaps a difference in the route of infection for the two viruses.

Owing to the distance between the source of material and the laboratory facilities, collection of the sera during the early part of the disease was not often achieved, so that one is left in doubt as to which virus might have been the etiological agent in many cases where the antibodies were posi-

tive for both types. In 4 instances, however, serum was obtained in 5 to 8 days and in 1 or 2 weeks after entrance to the hospital, and then again after recovery (Table III). Protective substances for the equine strain were either absent or very weakly positive at first, becoming stronger after several weeks. Those to the St. Louis strain were also present in 3 of these sera but showed an initial potency, indicating that they had probably been acquired before the attack of encephalitis.

The antibodies appeared, perhaps weakly, as early as 8 days after the onset in those cases with a good recovery. With the sera examined from the groups shown in Table III, positive neutralization for the equine virus could be obtained at various periods up to one year after the onset. In 7 instances they were still present after 1 year or a little over, in 1 case at 2 years and in 2 others after 3 years and 2 months since recovery. There is every reason to believe, therefore, that the antiviral substances, if once established for this particular virus, may remain in the human serum for as long a time as for any other neurotropic virus disease. They were also found to

TABLE IV
Positive Neutralization Tests According to Age Distribution

		Total No. of Cases Tested	Under 5 Years	Total No. of Cases Tested	5 to 20 Years	Total No. of Cases Tested	Over 20 Years
County	Type of Virus						
Fresno 1937-38	Western Equine (Br strain)	3	2 + (1 weakly)	6	3 +	14	7 +
	St. Louis encephalitis		1 +		2 +		7 +
	Both viruses		1 +		1 +		4 +
Kern 1938	Western Equine (Br strain)	7	4 +	8	2 + of 7 tested	11	3 +
	St. Louis encephalitis		1 +		6 +		6 +
	Both viruses		0		2 +		4 +
Tulare 1937-38	Western Equine (Br strain)	1	0	12	1 + out	9	4 +
	St. Louis encephalitis		1 +		6 +		7 +
	Both viruses		0		1 +		2 +

persist in the stored material. A few sera collected in August, 1937, were found to be positive upon testing in February, 1939, about a year and a half. There was no way of knowing, however, whether the antibody content had depreciated considerably, since no tests for the equine virus had previously been made. It was also noticed that the antiviral substances for the St. Louis virus persisted after about 2 years' storage. In several instances titrations were made on the same sera at different intervals, and a decline in titer was noticed.

Because of the presence of protective substances for the two different viruses in the blood of many of these encephalitic patients where clinical symptoms were similar, it is difficult to decide as to the etiological factor, especially where the actual virus had not been found. It seems very probable, however, that antiviral bodies for the St. Louis strain were present in many of the patients for some time. Many of the people belonged to the transient labor group and probably had acquired these antibodies in Missouri, Oklahoma, or Texas. If that were so, one would expect the greater number positive for the St. Louis strain to be found among the older age groups. Also one would expect the appearance of both types of antibodies in one serum among the latter group and the presence of one or the other among the younger people. This view seems justified as observed by reference to Table IV where the positive neutralization tests against the two viruses are tabulated for the counties of Kern, Tulare, and Fresno, according to the age distribution. As the age increases the number of positive tests to both strains also increases and there are more positives to one type of virus alone among the younger children than among the adults. There were, however, more encephalitis cases among the adults in these particular

groups, 34 over 20 years of age, 26 from 5 to 20, and 11 under 5 years, with a predominance of the positive tests for the St. Louis virus (20 of the 34) among the oldest group. More positive neutralizations to the equine strain than to the St. Louis appeared among the younger people. One therefore may be justified in assuming that where a positive neutralization has been obtained for a particular virus alone among the children it is most probably the etiological agent of the neurotropic disturbance involved.

EPIDEMIOLOGY

Since 1934, in California there has been noticed a change in the type of labor population inhabiting the two Central Valleys where the majority of the large agricultural industries are located. Where formerly the incoming laborers had been Mexicans, Filipinos, or southeastern Europeans, now they were migrants from Missouri, Oklahoma, or Texas, who were unable to cope with the financial depression and the dust storm problems at home and were now looking for the hoped-for land of opportunity. Coming in largely by the southern route they settled in the Valley regions from Kern County at the southerly end, working northward with the change of crops (Figure II). Most of them were poor, the living quarters most inadequate and sanitation far from favorable. In consequence whatever diseases occurred in the vicinity usually appeared among this group. Among the people coming to the Kern County Hospital to be bled for the neutralization test after recovery from a neurotropic disturbance, 14 out of 37 had some connection with Oklahoma, Missouri, or Texas. The whole subject of the migrant labor problem in California has been very graphically presented by a recent article in *Fortune*.⁸ Residents from the middle and southwestern states have

MAP 1.

Distribution of Places in California where were Cases of Encephalities with Serums having a Positive Neutralization to the Virus of Western Equine Encephalomyelitis. 1937-1938.



gradually been moving toward the coast since 1930, with the greatest influx after 1934.

As noted, 1934 was the earliest date available when diseases of the central nervous system were reported in people whose sera were later shown to have neutralizing antibodies for the St. Louis virus. For the population from Kern County northward, all of these early cases were in the Central Valleys. From then on the number showing these antibodies seemed to increase and more frank cases of encephalitis were recorded for these areas. This was especially noticeable for the Tulare region where the sera obtained were more often positive to the St. Louis virus

than to the equine (Table I). Did the migrants bring in the St. Louis strain and start an endemic area for this disease, which in many instances might be clinically difficult to distinguish from non-paralytic poliomyelitis? and then were certain other conditions superimposed that initiated an outbreak of yet a third type of central nervous system disturbances which could be particularly invasive for the rural population?

From certain epidemiological observations it seems likely that from Kern County northward some such factors have been at work during the past 4 or 5 years. Poliomyelitis was undoubtedly already endemic in many of the Valley towns. From 1934 to 1937 the

migration westward occurred in the largest proportions and with it most probably a few cases of the St. Louis type of encephalitis that may have helped immunize some of the population. In addition, a third neurotropic virus, that of equine encephalomyelitis, acquired significance for human welfare.

Previous to 1937 there had been a series of dry years throughout this part of the state, but during 1937 and 1938 the rainfall was unusual. The snow was heavy in the mountains, there were late rains with subsequent floods in the river areas and dry lakes were filled, tules grew where they had not been for years and much water was present in the central lands where the larger towns are found. As a result many mosquitoes appeared and were everywhere noticeable. Although no insect has as yet been actually implicated in the spread of the equine disease in the field, yet from the experimental work of Kelser,⁹ Merrill and Ten Broeck,¹⁰ Madsen, Knowlton, and Rowe¹¹ and Giltner and Shahan,¹² it seems most probable that a biting insect such as the mosquito is an important factor in transmission of this virus. They have all been able experimentally to produce the disease by means of several species of infected mosquitoes.

Whether or not a vector is responsible for the dissemination of the St. Louis virus is still an open question. Because of the negative results for mosquito transmission by Leake, Musson, and Chope in 1933,¹³ the respiratory route of infection has been especially favored for this disease, largely because of the ease of intranasal transmission in mice. However, Webster, Clow, and Bauer¹⁴ demonstrated later that *Anopheles quadrimaculatus* if infected can retain this virus for life, while Lumsden¹⁵ has presented epidemiological evidence to show that *Culex pipiens* might

have been implicated during the St. Louis epidemic in 1933. Subsequently Mitamura and Yamada, as reviewed by Inada,¹⁶ have experimentally transmitted the virus of the Japanese B encephalitis by means of both *Culex pipiens* and *Culex tritaeniorhynchus*.

Although the disease of equine encephalomyelitis has been endemic among the horses in the San Joaquin and Sacramento Valley regions for many years, especially recognized since 1930 when the virus was first isolated by Meyer, Haring, and Howitt,¹⁷ there has been no noticeable association with any similar form in man. It is true that 3 cases occurring in veterinarians or persons in close contact with horses had been reported in 1932 by Meyer,¹⁸ but there was no associated outbreak among the general population. The largest epizootic among horses had appeared from 1930 to 1932 and scattered cases were subsequently reported but not in epidemic proportions. For that reason after the first appearance of a definite human encephalitis around Fresno in 1937, no connection was made between the two forms. It now seems apparent, however, that the virus was the causative agent of many of the cases and probably of the fatal ones, especially as at least 3 of the patients in Fresno County and 2 in Kern who were ill in 1937 had antibodies for the equine type alone when tested in 1938. Since no virus was actually recovered from any of them in 1937, the true nature of the disease remained unrecognized until the following year.

From reports of the veterinarians in both Kern and Fresno Counties in 1938 there was no unusual number of sick horses but the mosquitoes were very prevalent. One might wonder, if the mosquitoes were the vectors in the equine outbreak in 1930, why human cases were not recorded and why they should now appear when the disease in

horses had subsided. One can only surmise that the unusual climatic conditions have brought the insects closer to the human population areas. As shown in the map the people with encephalitis having positive antibodies for the equine virus were found in the drainage regions, in the central portions of the valleys and mainly on the outskirts of the larger towns. Many cases of encephalitis were reported from the cities of Bakersfield and Fresno, but the individuals usually lived in streets bordering on the outskirts, near open fields where the wind could waft insects from the undrained areas. There is also the possibility that the unusual climatic conditions had encouraged the increase of some new vector common to both man and animals taken in combination with perhaps another animal reservoir than the horse.

By the courtesy of Henry Bye of the Kern County Health Department, Figure I was drawn from figures taken from their records for the human cases and from those of Dr. Edwards for the equine. A record is given of the monthly appearance during 1938 of human and of equine cases in the same localities. Apparently only 10 horses were treated in areas where human encephalitic cases were found, 8 of which were within a 4 mile radius of Bakersfield, and the others not so many miles away. The peak for the horses came in July, and a month later for man. The disease in the animals seemed to

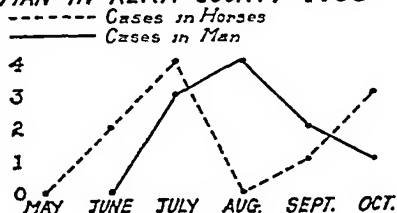
drop off and then re-occur later, with another rise in October. The number of equine cases was so small, however, that one cannot draw definite conclusions.

Most of the human encephalitic cases considered to be of the equine type by reason of the neutralization test or the isolation of the virus, have come from the areas shown in the map. In Kern County 5 patients were within the 4 mile radius of Bakersfield or if in the town were on the outskirts, 2 were from Buttonwillow, 2 near Edison, while 6 cases of encephalitis were reported from the Arvin district with 2 of the equine type. In Fresno County there were 5 patients within a 5 mile radius of Fresno and the others from a group of closely associated small towns not far from Fresno, 3 from Sangar, 2 from Kerman, and 1 each from Selma and Del Rey. Several individuals were reported as having encephalitis at Fowler but no definite results were obtained. In Tulare the people were also from associated districts where mosquitoes were most prevalent.

It seems very probable that a number of the cases reported as encephalitis in the Valley counties northward were also of the equine type, but unfortunately material was not available from them again and most of the sera first collected were exhausted. However, sufficient evidence was obtained from the few sera on hand to indicate a more general distribution of the equine virus in man throughout both of the valley regions than may have been suspected. Since the epizootic of 1930 and 1931 was widespread throughout both the Sacramento and San Joaquin Valleys (morbidity at that time being about 6,000 horses with an average mortality of 47 per cent, according to Meyer¹⁸), it is not unreasonable to suppose that the human form had been present, now that proof has been given of the infectiousness of this virus for man. Two

FIGURE I

NUMBER OF REPORTED CASES OF EQUINE ENCEPHALOMYELITIS FOR HORSES AND MAN IN KERN COUNTY 1938



of the 3 human cases reported by Meyer in 1932¹⁸ came from the Sacramento district and the third from Madera above Fresno. Serum was obtained again from the latter person 6 years after recovery but gave weakly positive protection for the Br strain.

Since nearly all of the positive cases in the counties of the lower San Joaquin Valley had possibilities of exposure to some form of vector but not necessarily to sick horses, especially in regard to the infants, it seems very likely that a biting insect has been the responsible agent for the recent outbreak of the equine disease.

DISCUSSION

During 1938 the actual recovery of the equine virus from fatal cases of human encephalitis was reported first by Fothergill, Dingle, Farber, and Connerly¹⁹ and Webster and Wright²⁰ for the eastern form in Massachusetts, and then by Howitt⁶ for the western in California. A more detailed account of the eastern outbreak was then given by Feemster²¹ and also by Wesselhoeft, Smith, and Branch²² who reported the histories of 8 fatalities in Massachusetts with recovery of the virus from 5. At about the same time Eklund and Blumstein²³ in Minnesota presented a clinical account of cases of human encephalitis closely associated with an equine epidemic during 1937. Since neutralizing antibodies for the western equine virus were found in the sera of 3 recovered patients, this strain was considered to be the etiological agent.

Prior to these reports the equine disease had not been incriminated for man except for the 3 cases already described by Meyer in 1932. It seems highly probable, however, that many acute cases of encephalitis without recovery of an active agent could have been attributed to this disease and that both non-paralytic poliomyelitis and the St. Louis type of encephalitis were confus-

ing factors in many instances. It was interesting that the latter virus was evidently intermixed in California in such a way as to cause confusion in differentiation. Since the actual virus has not as yet been recovered from these areas, it is still uncertain whether or not true cases have been present. It has been shown by Wooley and Armstrong³ and by Muckenfuss, Smadel, and Moore⁵ that antibodies to this virus may be found among the general population in an endemic area, comparable to what has been reported for poliomyelitis. For this reason, as demonstrated by Smith and Moore,²⁴ too much diagnostic significance should not be placed on their presence in acute cases unless the serum of the patient is negative during the early stages of the disease and later shows a rise in antibody content after recovery. So far in the California areas affected there has not been any generalized immunization to the equine virus, because only those persons showing an acute disturbance of the central nervous system developed antiviral substances. Normal people and those having acquired poliomyelitis in the Bay Region were all negative, with the exception of one individual in the San Joaquin Valley whose history was unknown.

This differentiation in the presence of antibodies to both viruses leads one to suspect that the equine form has rather recently become of human significance, probably because of the sudden appearance of a new vector or perhaps a new reservoir host. The eastern virus has lately been recovered in nature from both the pigeon²⁵ and the pheasant²⁶ so that some such host may also be present in the West. Whatever is later proved, it seems warrantable to assume that at present the occurrence of protective substances for the western equine virus has some diagnostic value in the Californian regions affected and that this disease

first became of marked significance to human welfare during 1937. Sporadic cases very likely occurred throughout the northern and central valleys during the previous years but were reported either as non-paralytic poliomyelitis or as some form of encephalitis of unknown etiology. Sera were positive for 2 cases having their onset in 1935 and for 1 in 1936. A more complete survey of the population would undoubtedly show a larger number of positive tests. On the other hand, the simultaneous presence in a serum of antibodies for the St. Louis virus may not have as much value because of a more generalized immunization in certain Valley areas.

SUMMARY

1. An outbreak of the western type of equine encephalomyelitis occurred among the human population of the two large Central Valleys in California during 1937 and 1938.

2. The western strain of the equine virus was recovered from the brain and the blood, respectively, of 2 human cases of encephalitis in this region. Both strains were shown to be immunologically and serologically similar to the virus of equine origin.

3. Total number of cases of encephalitis tested throughout northern and central California:

Positive neutralization to the St. Louis virus: 49 (47.5 per cent) out of 103 sera.

Positive neutralization to the equine virus (Br): 32 (37.0 per cent) out of 86 sera.

4. Number of cases of encephalitis tested in Fresno, Tulare and Kern Counties only:

Positive neutralization to the St. Louis virus: 37 (52.1 per cent) out of 71 sera.

Positive neutralization to the equine virus (Br): 26 (44 per cent) out of 59 sera.

5. Positive neutralization to both viruses: 18 (26 per cent) out of 69 sera.

6. Of a total of 63 apparently normal individuals, contacts and non-contacts, residing in both the Bay Region and the Valley districts, 8 had neutralizing substances for the St. Louis virus and 1 for the equine. With the exception of 1 for the St. Louis type, all of the positive group resided in the San Joaquin Valley.

7. Of a total of 47 individuals tested for equine virus and 60 tested for the St. Louis strain among groups diagnosed as having poliomyelitis in both the Bay Region and in

the Valleys, the only positive sera for either virus were from those in the San Joaquin Valley.

8. Fourteen of 21 sera positive to the Br equine strain also gave strongly positive neutralization with the western virus of equine origin (Californian), while 4 were weakly positive.

9. Neutralizing antibodies for the Br equine virus could be obtained as early as 8 days after onset of the disease and were found in some individuals after 1, 2, or even 3 years since recovery. Positive sera for both the St. Louis and the equine strains retained their neutralizing power after storage for from 1 to 2 years, but potency was decreased.

10. In the encephalitic series as the age increased, the number of positive neutralization tests to both strains increased and there were more positives to a single type of virus alone among the younger groups than among the older. The predominance of positive tests for the St. Louis virus was among the older people, while that for the equine was among the younger.

11. No very definite relationship was noted between cases of the equine disease in horses and those in man, since the former did not reach epidemic proportions of those showing clinical symptoms and the observed cases were only occasionally in concurrent areas. Swampy lands and many mosquitoes, however, were in close association with the districts affected.

12. From the epidemiological evidence it seems likely that the equine virus was transmitted to man through some vector.

13. The St. Louis strain was brought in because of the migrant labor population.

CONCLUSION

The western virus of equine encephalomyelitis has been found capable of infecting man in certain districts of northern and central California and neutralizing substances for this strain have been found in the sera of 32 (37.0 per cent) out of 86 encephalitic cases diagnosed in 1937 and 1938. Forty-nine (47.5 per cent) out of 103 sera of this group gave positive protection tests for the virus of St. Louis encephalitis.

REFERENCES

1. Wynns, H. L., and Hawley, C. J. Epidemiology of Epidemic Encephalitis in California. *A.J.P.H.*, 29, 7:781 (July), 1939.
2. Howitt, B. F. Neutralization and Complement

Fixation Tests with Four Neurotropic Viruses and Human Sera Collected in California During 1937 and 1938. *J. Bact.*, 36:52, 1938.

3. Wooley, J. G., and Armstrong, C. The Distribution of Immunity Against Encephalitis Virus of the St. Louis Type in the United States as Determined by the Serum-Protection Test in White Mice. *Pub. Health Rep.*, 49:1495, 1934.

4. Webster, L. T., Fite, G. L., and Clow, A. D. Experimental Studies on Encephalitis. IV. Specific Inactivation of Virus by Sera from Persons Exposed to Encephalitis, St. Louis Type, 1933. *J. Exper. Med.*, 62:827, 1935.

5. Muckenfuss, R. S., Smadel, J. E., and Moore, E. The Neutralization of Encephalitis Virus (St. Louis, 1933), by Serum. *J. Clin. Investigation*, 17:53, 1938.

6. Howitt, B. F. Recovery of the Virus of Equine Encephalomyelitis from the Brain of a Child. *Science*, 88:455, 1938.

7. Howitt, B. F. Recovery of the Virus of Equine Encephalomyelitis (Western Type) from Human Blood Serum. In Press.

8. "I Wonder Where We Can Go Now." *Fortune*, 19, 4:91, 1939.

9. Kelsner, R. A. Mosquitoes as Vectors of the Virus of Equine Encephalomyelitis. *J. Am. Vet. Med. Assoc.*, 82:767, 1933.

10. Merrill, M. H., and Ten Broeck, C. The Transmission of Equine Encephalomyelitis Virus by *Aedes aegypti*. *J. Exper. Med.*, 62:687, 1935.

11. Madsen, D. E., Knowlton, G. F., and Rowe, J. A. Further Studies on Transmission of Equine Encephalomyelitis by Mosquitoes. *J. Am. Vet. Med. A.*, 89:187, 1936.

12. Giltner, L. T., and Shahan, M. S. The present Status of Infectious Equine Encephalomyelitis in the United States. *J. Am. Vet. Med. A.*, n.s., 41:363-374, 1936.

13. Leake, J. P., Musson, E. K., and Chope, H. D. Epidemiology of Epidemic Encephalitis, St. Louis Type. *J.A.M.A.*, 103:728, 1934.

14. Webster, L. T., Clow, A. D., and Bauer, J. H. Experimental Studies on Encephalitis; Survival of Encephalitis Virus (St. Louis Type) in *Anopheles quadrimaculatus*. *J. Exper. Med.*, 61:497, 1935.

15. Lumsden, L. L. Observations of the Epidemiological Features of Epidemic Encephalitis Lethargica. Personal communication, 1938.

16. Inada, R. Du mode d'infection dans l'encéphalite épidémique. *Presse med.*, 45:386, 1937.

17. Meyer, K. F., Haring, C. M., and Howitt, B. F. The Etiology of Epizootic Encephalomyelitis of Horses in the San Joaquin Valley, 1930. *Science*, 74:227, 1931.

18. Meyer, K. F. A Summary of Recent Studies on Equine Encephalomyelitis. *Ann. Int. Med.*, 6:645, 1932.

19. Fothergill, LeR. D., Dingle, J. H., Farber, S., and Connerly, M. L. Human Encephalitis Caused by the Eastern Variety of Equine Encephalomyelitis. *New Eng. J. Med.*, 219:411, 1938.

20. Webster, L. T., and Wright, F. H. Recovery of Eastern Equine Encephalomyelitis Virus from Brain Tissue of Human Cases of Encephalitis in Massachusetts. *Science*, 88:305, 1938.

21. Feemster, R. F. Outbreak of Encephalitis in Man Due to the Eastern Virus of Equine Encephalomyelitis. *A.J.P.H.*, 28:1403, 1938.

22. Wesselhoef, C., Smith, E. C., and Branch, C. F. Human Encephalitis; Eight Fatal Cases, with Four Due to the Virus of Equine Encephalomyelitis. *J.A.M.A.*, 111:1735, 1938.

23. Ecklund, C. M., and Blumstein, A. The Relation of Human Encephalitis to Encephalitis in Horses. *J.A.M.A.*, 111:1734, 1938.

24. Smith, M. G., and Moore, E. Neutralization of the Virus of St. Louis Encephalitis by Serums from Children. *J. Infect. Dis.*, 63:319, 1938.

25. Fothergill, LeR. D., and Dingle, J. A. A Fatal Disease of Pigeons Caused by the Virus of the Eastern Variety of Equine Encephalomyelitis. *Science*, 88:549, 1938.

26. Tyzzer, E. E., Sellards, A. W., and Bennett, B. L. The Occurrence in Nature of "Equine Encephalomyelitis" in the Ring-necked Pheasant. *Science*, 88:505, 1938.

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Detection of *Trichinella* Infestation in Hogs by the Intradermal Test*

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THE work of recent years has shown that in the United States human infestation with *Trichinella spiralis* is much more common than was heretofore believed. Thus, 11 investigators¹⁻¹¹ whose papers have been published since 1930, report a total of 5,941 human cadavers examined, of which 935 were infested with trichinella, an incidence of 15.7 per cent. The control of trichinella infestation is therefore a subject which should interest the health officer.

It has long been recognized that the routine microscopic examinations of pork flesh, such as are carried on in various European countries, are quite unreliable, failing in many instances to reveal an existing infestation. Bachman,¹² in 1928, called attention to a useful precipitin test, and in a later article in the same year described a clearly defined, delayed type of skin reaction in rabbits and guinea pigs artificially infected with trichinella. Some time afterward, Augustine and Theiler¹³ began a well planned study of both the precipitin and the skin tests, applying them not only to swine but also to humans. In general, they followed Bachman's technic for preparing the antigen for the intradermal test. They also emphasized the immediate

character of the skin reaction obtained.

The present study was made to determine the value and accuracy of the intradermal test in detecting trichinous animals in a group of city-owned, garbage-fed hogs.

ANTIGEN PREPARATION

Albino rats weighing between 100 and 125 grams were starved 24 hours and then fed about 5 gm. of cheese which contained approximately 100 trichina larvae per gm. After 6 weeks, the animals were killed, skinned, and eviscerated. The carcasses were ground and then set aside for digestion in a fluid made by dissolving 5 gm. of pepsin in a liter of warm tap water and adding 7 cc. of concentrated hydrochloric acid. For every 50 gm. of meat, 2 l. of digestive fluid were used.

The apparatus and method for the digestion were similar to those used by Bozicevich.¹⁴ A 4 l. funnel, to the stem of which a centrifuge tube was attached by a short piece of rubber tubing, was used. A pinchcock was placed at the end of this tubing to permit closing, and the centrifuge tube containing larvae was removed after digestion of the meat. A crossbar, made by tying together two pieces of glass tubing, was placed in the funnel, and over this were laid 4 layers of cheesecloth. The digestive fluid was poured into the funnel and the meat carefully placed on top of the cheese-

* To be read before the Food and Nutrition Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939.

cloth. The funnel was put in an incubator at 38° C. for 18 hours, at the end of which, the trichinae which had been liberated from their cysts by the digestive fluid had gravitated to the bottom of the centrifuge tube. The pinchcock on the rubber tubing was then closed and the centrifuge tube removed. The supernatant fluid along with the layer of sediment was removed by means of a pipette.

To remove some of the débris which had settled with the larvae at the bottom of the centrifuge tube, a 250 cc. funnel was set up in a manner similar to the one described above, the only difference being that no crossbar was used to support the cheesecloth. About 200 cc. of warm tap water was poured into the funnel and into this the contents of the centrifuge tube containing the trichina larvae mixed with some débris was washed.

In about 30 minutes, all of the larvae almost free of visible contamination had passed through the gauze and settled to the bottom. The rubber tubing was closed with the pinchcock and the centrifuge tube removed. The supernatant fluid was removed by a pipette and the larvae were washed several times with 0.5 per cent sodium bicarbonate solution. After each washing, the tube was set aside for 30 minutes, during which the larvae settled to the bottom and the supernatant fluid was removed.

At the third washing, a biuret test was performed on the supernatant fluid and found to be negative. Therefore, no further washings were done and the larvae were placed in an agate mortar and put into a vacuum desiccator containing phosphorous pentoxide. After evacuation of the air, the desiccator was placed in the refrigerator for 24 hours. The trichinae were then pulverized, weighed, and the powder extracted with 0.85 per cent sodium chloride solution, using 1:500 dilution.

After extraction for 2 hours at room temperature, the suspension was placed in the ice box for 3 days, at the end of which time the suspension was placed in a water bath at 58° F. for 1 hour on 3 successive days.

A portion of this suspension was then centrifuged at 3,000 revolutions per minute for 20 minutes. The supernatant fluid constituted the antigen used in our test. Prior to injecting the pigs, the antigen was standardized with the aid of artificially infested rats. The rats were divided into two groups of 12 each. The first group was injected with 0.1 cc. of the uncentrifuged antigen, using 3 rats each for dilutions of 1:500, 1:2,500, 1:5,000, and 1:10,000. This was repeated on the second group of 12 rats with centrifuged antigen. With the exception of the 1:500 concentration, Coca's solution (sodium chloride 0.7 per cent, sodium bicarbonate 0.05 per cent, phenol 0.4 per cent) served as the diluent and was also used for the control injection. Physiological saline was used in the control injection for the rats which received the 1:500 dilution of antigen. In all 24 rats, each dilution gave immediate type positive reactions, with wheals which at the end of 20 minutes averaged about 2.0 cm. in diameter. This indicates that the active principles are apparently in the supernatant eluted portion. It was this portion that was used for the intradermal skin test of hogs.

TESTING THE PIGS

The great majority of pigs used were of the graded Chester White and graded Yorkshire White breeds with several animals of the Poland China variety. The hogs were fed with uncooked swill. The garbage often contained considerable quantities of frankfurters, smoked sausages, bologna-style sausages, smoked ham, and other pork products. On no occasion was the garbage sterilized

TABLE I

Pig No.	Skin Reaction	Diaphragm Digestion Findings	Observations
19	Negative	Negative	Papillary dermatitis
20, 24, 31	Positive	Positive †	Normal
23, 34	Positive	Positive *	Normal
46	Positive	Positive ‡	Normal
48	Positive	Positive †	Normal
4A	Positive	Negative	Wide area of erythema
5A, 6A, 15A	Positive	Positive *	Normal
7A	Positive	Negative	Papillary dermatitis of the skin
26A	Negative	Positive (very light infestation)	Heavy thickening of the epidermis
35A	Negative	Negative	Scaly dermatitis
NOTE: 44 pigs	Negative	Negative	Normal

* Light Infestation (1 to 10 larvae per gm.)

† Moderate Infestation (11 to 25 larvae per gm.)

‡ Heavy Infestation (26 or more larvae per gm.)

before being fed to the swine. The pigs averaged about 1 year of age before slaughter and in almost all cases, were killed 1 to 5 days after they were injected. The skin test was performed on the inner surface of the distal tibial region. The hair was removed with a clipper from a $2\frac{1}{2}$ sq. in. area, the surface washed with alcohol, and 0.1 cc. of the antigen was injected. The control injection of Coca's solution was given approximately 4 cm. from the site of the injected antigen.

In Tables I and II, we list only those pigs which showed deviations from the normal. The antigen used in the series shown in Table I was diluted with Coca's solution to a 1:10,000 dilution. Readings of the injected site were usually made in from 20 to 45 minutes. The wheal which forms is 1.5 to 2.5 cm. in diameter, and assumes a faint purplish-red hue with definite margins, without any noticeable erythema or edema of the surrounding tissues. Usually at the time of the reading, the bleb first formed by the control injection had almost disappeared.

In order to determine whether the skin diagnosis was correct, the dia-

phragms of the hogs were removed at the time of slaughter and digested as described in the preparation of the antigen, after removal of fat and grinding. For every 50 gm. of meat, 1 l. of digestive fluid was used. A convenient modification was the use of percolators of approximately 4 l. capacity instead of funnels in the digestion of the meat. The percolators were kept at 37° C. for 18 hours, at the end of which the attached centrifuge tubes were removed and examined for trichina larvae.

In the series shown in Table II, the antigen was diluted with 0.85 per cent saline containing 0.5 per cent phenol instead of Coca's solution, and this saline was used for the control injection.

Pigs 4A, 7A, 55, and 84, which gave positive reactions, showed no trichina larvae in the diaphragms. In pig 4A, there was an erythema of the entire clipped surface with a slight elevation 1 cm. in diameter. In pigs 7A, 55 and 84, there was a papillary dermatitis of the skin which, at the time of reading, showed a widespread erythematous area with several papillae. Pig 26A, which gave a negative skin test, showed 250 larvae in the diaphragm that

TABLE II

<i>Pig No.</i>	<i>Skin Reaction</i>	<i>Diaphragm Digestion Findings</i>	<i>Observations</i>
10, 12	Positive	Positive ‡	Normal
47A	Positive	Positive *	Normal
55	Positive	Negative	Papillary dermatitis
58	Negative	Negative	Marked papillary dermatitis and thickening of the epithelium
61	Negative	Negative	Papillary dermatitis
62	Negative	Negative	Marked papillary dermatitis
64	Negative	Negative	Tumor, midline between umbilicus and groin
74	Positive	Positive †	Normal
84	Positive	Negative	Marked papillary dermatitis

NOTE: The clipped skin of animals 85 to 179, or 83 pigs, received no alcohol washing prior to injection.

99	Negative	Negative	Mild dermatitis, thickening of the epithelium
100, 124	Negative	Negative	Papillary dermatitis
107, 109, 111	Positive	Positive *	Normal
125, 134, 136	Positive	Positive *	Normal
135, 140, 145	Negative	Negative	Papillary dermatitis
148, 149, 154	Negative	Negative	Papillary dermatitis
155	Negative	Negative	Erythema of legs and abdomen
167, 168, 170	Negative	Negative	Papillary dermatitis
173, 175, 179	Negative	Negative	Papillary dermatitis
NOTE: 119 pigs	Negative	Negative	Normal

* Light Infestation (1 to 10 larvae per gm.)

† Moderate Infestation (11 to 25 larvae per gm.)

‡ Heavy Infestation (26 or more larvae per gm.)

weighed 365 gm., or a very slight infestation. This pig had a marked epidermal thickening which was difficult to inject.

In pigs 85 to 179, no alcohol was used to wash the skin surface prior to the injection.

DISCUSSION

Altogether, 211 pigs were intradermally injected with trichinella antigen and skin readings were made within 20 to 45 minutes, the average being 30 minutes. Of these 25 were diagnosed

as positive and 186 as negative. Upon corroborative examination of the digested diaphragms, it was found that 21 out of 25 diagnosed as positive were trichinous, and 185 of the 186 diagnosed as negative were non-trichinous. Thus, 206 out of 211 pigs were correctly diagnosed, an accuracy of about 97 per cent. In this series, the incidence of trichinosis was 10.4 per cent.

It is advisable not to wash the skin surface with alcohol before injection of the antigen. This is especially important when a papillary dermatitis exists,

because of possible distension and erythema.

In pigs 85 to 179, where no alcohol was used, there were 16 pigs with papillary dermatitis, and in all the correct diagnosis was made. It is suggested, therefore, that pigs 7A, 55, and 84, with papillary dermatitis, may have been incorrectly diagnosed for this reason.

One pig, 26A, passed by the skin test as not trichinous, was found at autopsy to be infected. This pig had marked epidermal thickening, and was difficult to inject. In such cases, there is a possibility that the needle does not come into contact with the capillary circulation. Under these circumstances, no reaction will result even if the animal is trichinous. Pig 26A showed 250 larvae in a diaphragm weighing 365 grams. This is a very light infestation. It is important to remember that the intensity of the skin reaction bears no relation to the degree of infestation. In pig 111 the skin test gave a wheal, $2\frac{1}{2}$ cm. in diameter and well elevated in 25 minutes. From the digested diaphragm, only 4 larvae per gm. were obtained, denoting a light infestation. In this series of cases the small error in the skin tests was in the direction of safety, the test being more likely, now and then, to diagnose a normal pig as trichinous, than to permit a trichinous pig to pass as normal.

SUMMARY

Two hundred and eleven pigs were skin-tested with trichinella antigen. All the pigs had been fed on uncooked garbage. Post-mortem examination of the digested diaphragms was made as

a check on the diagnostic accuracy of the skin test. In 4 out of 25 pigs diagnosed as trichinous by skin tests, no evidence of infestation was found at autopsy; in 1 pig out of 186 diagnosed as non-trichinous, post-mortem examination showed trichinosis. Of 211 pigs skin-tested, 206 were correctly diagnosed as to the presence or absence of trichinous infestation. This is an error of less than 3 per cent. The error, moreover, is in the direction of safety, being more likely now and then to diagnose a normal animal as trichinous, than to pass a trichinous pig as normal.

REFERENCES

1. Butt, E. M. (James B. McNaught). Trichinosis. *California & West. Med.*, 48, 166-71 (Mar.), 1938.
2. Wright, W. H. Studies on Trichinosis—The Epidemiology of *Trichinella Spiralis* Infestation and Measures Indicated for Control of Trichinae. *A.J.P.H.*, 29:119-127, 1939.
3. Hinman, E. H. Trichinosis in Louisiana. *New Orleans M. & S. J.*, 88:445-448, 1936.
4. Magath, T. B. Encysted Trichinae. *J.A.M.A.*, 108:1964-1967, 1937.
5. McNaught, J. B., and Anderson, E. V. The Incidence of Trichinosis in San Francisco. *J.A.M.A.*, 107:1446-1448, 1936.
6. Pote, T. B. Department of Pathology, Washington, University of St. Louis, Mo. Personal Communication of Unpublished Experiments to W. Sawitz of Department of Tropical Medicine, Tulane University, University of Louisiana, New Orleans, La.
7. Queens, F. B. Prevalence of Human Infection with *Trichinella Spiralis*. *J. Parasit.*, 18:128, 1931.
8. Queens, F. B. (Charles H. Scheffley). The Prevalence of Trichinosis. *Am. J. Hyg.*, 27:142-147 (Jan.), 1938.
9. Reiley, W. A., and Scheffley, C. H. Trichinosis of Man, a Common Infection. *J.A.M.A.*, 102:1217-1218, 1934.
10. Sawitz, W. Prevalence of Trichinosis in the U. S. *Pub. Health Rep.*, 53:365 (Mar. 11), 1938.
11. Scheffley, Charles H. The Prevalence of Trichinosis. *Am. J. Hyg.*, 27:142-147 (Jan.), 1938.
12. Bachman, G. W. *J. Prev. Med.*, 2:35, 513, 1928.
13. Augustine, D. L., and Theiler, Hans. Precipitin and Skin Tests as Aid in Diagnosing Trichinosis. *Parasitol.*, 24:60-86, 1932.
14. Bozicevich, John. The Preparation and Use of an Improved Trichina Antigen. *Pub. Health Rep.*, 53:2130 (Dec. 2), 1938.

Experimental Infection of *Dermacentor Andersoni* Stiles with the Virus of Lymphocytic Choriomeningitis*

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ALTHOUGH only 4 years have elapsed since Armstrong and Lillie¹ showed that lymphocytic choriomeningitis is an infectious disease caused by a virus, the evidence indicates that the etiologic agent can be transmitted in several ways. Traub² has shown that the virus is discharged in the urine and nasal secretions of infected mice. Findlay and Stern³ succeeded in infecting 3 of 20 mice by nasal instillation of the virus. Finally Wooley, Armstrong, and Onstott⁴ have been able to transmit infection occasionally by instilling the virus into the urethra or vagina of monkeys. They have also demonstrated the virus in the seminal fluid and testicular tissue of infected animals. On the basis of these findings, together with the fact that antibodies against the virus were found by them more commonly in adults and especially in criminal and merchant seamen classes, these investi-

gators have suggested a venereal route of transmission.

However, the higher incidence of antibodies against this virus in criminals and merchant seamen may be accounted for by the greater opportunity for contact with infected mice and rats. Thus Findlay, Alcock, and Stern⁵ have isolated the virus of this disease from a patient who lived in an old house overrun with rats and mice. These authors intimate that they believe this may be a general source of infection.

Naturally infected mice have been found by Traub² and Lepine and Sautter.⁶ It is possible that other species of rodents such as ground squirrels and rats may also be naturally infected with lymphocytic choriomeningitis. Traub⁷ and Rivers and Scott⁸ noted that normal mice and guinea pigs are not readily infected by contact with infected animals, an observation which we have confirmed. The manner in which naturally infected mice contracted the disease is unknown. These findings suggested the possibility that blood sucking arthropods may be one means of transmitting the virus of this disease from rodent to rodent.

In the experiments reported here the

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Rocky Mountain wood tick (*Dermacentor andersoni*, Stiles) was used as a convenient test vector. These were laboratory reared ticks obtained through the courtesy of Dr. R. R. Parker of the Rocky Mountain Laboratory of the U. S. Public Health Service and believed by him to be free from other infectious diseases. We noted no evidences of carriage of other diseases by the ticks during the course of our work, and control studies with uninfected ticks were always negative.

The strains of mice and guinea pigs used in our experiment were shown not to be naturally infected with lymphocytic choriomeningitis by subjecting them to intracerebral injection of starch, broth, or normal brain emulsion, procedures which have been found will activate latent infection with this virus into a typical syndrome.⁵ Our experimental animals were also tested for immunity resulting from possible previous subclinical infections by injecting large numbers intracerebrally with virus. No evidence of immunity was discovered.

Adult forms of the tick were fed by

confining them on the shaved bellies of guinea pigs under screw-top screen capsules such as described by Jellison and Philip.⁹ Since larvae and nymphs often become stuck to the adhesive tape girdle, it was necessary to use the technic described by Wolbach¹⁰ for feeding the immature stages. These forms were introduced into a covered jar containing the guinea pig on which they were to feed. The inner surface of the jar near the top was coated with vaseline to keep them from escaping. At the end of three days the guinea pig with attached ticks was transferred to a similar jar and the first jar steamed to kill unattached ticks. The animal remained in the second jar until the engorged nymphs or larvae had dropped. The latter were then collected and transferred to test tubes for further studies.

Rivers and Scott⁸ stated that the blood of guinea pigs inoculated intracerebrally is infectious for mice as early as the 4th day after inoculation. We have been able in three experiments to show that, following combined intracerebral and subcutaneous inoculation

TABLE I

*Persistence of the Virus of Lymphocytic Choriomeningitis in the Blood Stream of Infected Guinea Pig 3140 * (First Experiment)*

Guinea Pig No.	Day Following Inoculation	No. of cc. of Heart's Blood Inoculated †	Result
3439	1	0.2	Died in 9 days
3402	2	0.2	Died in 9 days
3405	3	0.2	Died in 10 days
3406	4	0.2	Died in 9 days
3407	5	0.2	Died in 8 days
3408	6	0.2	Died in 10 days
3409	7	0.2	Killed accidentally on 5th day ‡
3413	8	0.2	Died in 8 days
3145	Control **	0.2	Negative

* Guinea pig 3140 died on the 8th day following intracerebral (0.2 cc.) and subcutaneous (2 cc.) inoculation with 10 per cent guinea pig brain emulsion infected with virus strain W. E. 9210.

† Heart's blood in 2 per cent potassium oxalate was injected intracerebrally.

‡ This guinea pig had a typical temperature rise and lost 50 grams of weight before being accidentally strangled on the 5th day following inoculation.

** The control guinea pig was inoculated with heart's blood drawn just before injecting guinea pig 3140 with the virus. Later this control guinea pig was found to be susceptible to subcutaneous inoculation (0.2 cc. of 1/100 dil.) of infected guinea pig brain emulsion.

of the W. E. 9,210 strain of virus, active virus appears in the blood stream of infected guinea pigs as early as 24 hours after inoculation and persists until the death of these animals. Sample protocols are outlined in Tables I and II. Virus in sufficient quantities to infect mice appeared in the blood stream of guinea pigs 48 hours after rubbing virus on their lightly scarified skins. The scarification was not deep enough to draw blood. From these studies it appeared that feeding ticks might become infected at any time from one day after infection until death.

Preliminary experiments in which ticks were collected after feeding on infected animals, ground up, and injected into normal animals indicated that larvae, nymphs, and adults, both male and female, can be experimentally infected in this manner. Infection persisted in adult ticks for at least as long as 13 days. Stage to stage transmission of the virus in ticks was also demonstrated by injecting ticks which had engorged in their previous stages on infected guinea pigs. The eggs of adult females which had engorged on infected guinea pigs also

TABLE II

Persistence of the Virus of Lymphocytic Choriomeningitis in the Blood Stream of Infected Guinea Pig 3436 (Third Experiment)*

<i>Day Following Inoculation</i>	<i>Cage No.</i>	<i>Virus Dilution †</i>	<i>Day of Death of Mice</i>	<i>No of Mice Surviving</i>
1	75	1/10	9, 11.....	0
	76	1/100	11.....	1
	77	1/1,000	.....	2
2	78	1/10	8, 10.....	0
	79	1/100	8, 8.....	0
	80	1/1,000	9.....	1 (1) ‡
3	82	1/10	7, 8.....	0
	83	1/100	8, 9.....	0
	84	1/1,000	9, 9.....	0
4	85	1/10	9, 9.....	0
	86	1/100	14, 14....	0
	87	1/1,000	8, 8.....	0
6	88	1/10	9, 10.....	0
	89	1/100	8, 10.....	0
	90	1/1,000	11.....	1 (1) ‡
6	92	1/10	9, 10.....	0
	93	1/100	10, 10....	0
	94	1/1,000	10.....	1 (1) ‡
7	95	1/10	7, 9.....	0
	96	1/100	9, 11.....	0
	97	1/1,000	9, 10.....	0
8	98	1/10	6, 8.....	0
	99	1/100	7, 8.....	0
	100	1/1,000	9, 12.....	0
Control **	74	1/10	.....	2

* Guinea pig 3436 died on the 8th day following intracerebral (0.2 cc.) and subcutaneous (2 cc.) inoculation with 10 per cent guinea pig brain emulsion infected with virus strain W. E. 9210.

† 0.03 cc. of heart's blood in 1 per cent sodium citrate solution diluted in buffered saline was injected intracerebrally into two mice for each dilution.

‡ Indicates number of surviving mice that developed typical signs of lymphocytic choriomeningitis but recovered.

** The control mice were inoculated with heart's blood drawn just before injecting guinea pig 3436 with the virus.

contained sufficient virus to kill guinea pigs injected with them. In one experiment the virus was shown to persist from infected adult ticks through their eggs and to the larval stage. It is of interest that the ticks which had engorged in their previous stage on an infected animal were apparently not infectious until they had engorged on a normal guinea pig. This parallels the phenomenon which occurs in Rocky Mountain spotted fever.

Although adult ticks probably would not migrate under natural conditions from animal to animal after they had once begun to feed, transmission experiments were carried on with them as well as with larvae and nymphs. In order to rule out the possibility of an extrinsic incubation period of the virus in the ticks, varying periods of time were allowed to elapse before transferring ticks from infected guinea pigs to normal animals as shown in Table III. All of the guinea pigs upon which the infected ticks were fed continued to gain weight in a normal manner, and none of them showed any significant temperature rise or other symptoms of

the disease during the 28 days that they were observed. Three weeks after the infected ticks were removed, the guinea pigs were tested for immunity by subcutaneous inoculation of virus to which all succumbed with typical signs of lymphocytic choriomeningitis.

Similarly all attempts to transmit the virus by feeding adults which had engorged in their nymphal stage failed. In our earlier experiments we encountered failure in attempting to transmit the virus by feeding nymphs which had engorged in their larval stage on infected animals. Since these findings were first reported, however, experiments have been completed showing that nymphs, which had engorged in their larval stages on an infected guinea pig, successfully transmitted the virus of lymphocytic choriomeningitis to normal guinea pigs by feeding on them. It is probable that our earlier failures to transmit infection in this manner were due to attachment of an inadequate number of infected nymphs to the test animal. In a personal communication Dr. Parker states that some batches of ticks fail to feed well.

TABLE III

Attempts to Transmit the Virus of Lymphocytic Choriomeningitis by Feeding Infected Adult Ticks on Normal Guinea Pigs

Tick Lot No.	No. of Ticks Fed		Days Elapsed Before			Result
	Male	Female	Days Fed on Infected Guinea Pig	Feeding on Normal Guinea Pig	Days Fed on Normal Guinea Pig	
3141	2	2	7	½	4	Negative
3410	8	3	4	½	6	Negative
3418	1	15	5	½	5	Negative
3110 *	1	2	5	8	5	Negative
3469	2	4	5	14	5	Negative
3456	0	4	5	21	6	Negative
3111	2	5	..	..	10	Negative
(Control)						
3142 †	2	4	..	..	10	Negative
(Control)						
3417	10	4	..	..	11	Negative
(Control)						

* Six infected nymphs were included in this lot.

† Seven unfed nymphs were included in this lot.

Another possibility of natural transmission remained. In relapsing fever and plague it is believed that infection is acquired mainly by rubbing the infected dejecta of the lice or fleas into the wound by scratching the bitten area. Since we had already demonstrated that virus could penetrate the lightly scarified skin, this possible route of transmission was investigated. Feces from feeding adult ticks which had engorged in their previous stage were found to be infective when applied to a small area (about 3 x 3 sq. cm.) of skin scarified too lightly to draw blood. It was also found that crushed adult ticks applied to scarified skin caused typical symptoms of the disease in guinea pigs. Control experiments with normal tick feces and crushed ticks were uniformly negative.

SAMPLE PROTOCOL

Application of Infected Adult Tick Feces to the Lightly Scarified Skin of Normal Guinea Pig:

I. Control—

April 8, 1939, sufficient feces were collected from 8 adult female and 6 adult male ticks engorging on infected guinea pig 4006, 8 days after the ticks had attached, to prepare a 10 per cent suspension in buffered saline. Guinea pig 4012 was inoculated subcutaneously (1 cc.) with infected tick feces suspension. *Micrococcus epidermidis* and hay bacilli were isolated from the infected tick feces suspension.

Temperature record of guinea pig 4012: April 8, 101.7 (normal temperature before injecting tick feces); April 9, 101.6; April 10, 104.2; April 11, 104.8; April 12, 103.9; April 13, 101.5 (labored breathing); April 14, animal found dead. This animal lost 32 grams in 7 days.

At autopsy the brain was very hyperemic, and the other organs were apparently negative. No bacteria were isolated from the brain tissue. A 10 per cent brain suspension was then prepared and injected subcutaneously (2 cc.) into guinea pig 4015 and intracerebrally (0.03 cc.) into each of 2 white mice (cage 1A). Both of the mice developed typical signs of lymphocytic choriomeningitis in 8 days but recovered. Twenty-seven days after the first inoculation both mice and 2

controls were inoculated intracerebrally (0.03 cc.) with a 10 per cent suspension of infected guinea pig brain. The mice were immune to the virus because they remained normal during the 30 days that they were observed, while the 2 control mice succumbed in 7 and 10 days respectively. Guinea pig 4015 developed typical signs of lymphocytic choriomeningitis and succumbed in 9 days. No bacteria were isolated from the brain tissue of guinea pig 4015.

II. Tick feces applied to the lightly scarified skin—

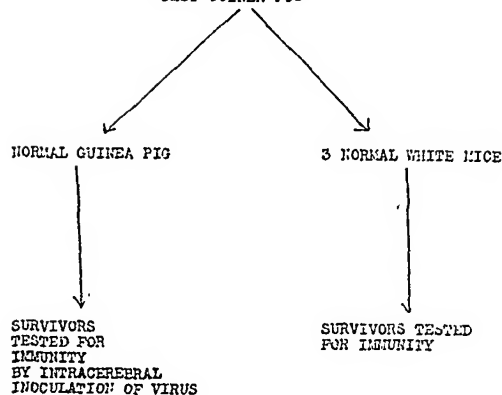
April 8, 1939, the same 10 per cent suspension of infected tick feces was also applied to the lightly scarified skin of guinea pig 4014 with a cotton swab. Scarification was accomplished by making 8 scratches in the shaven skin not deep enough to draw blood by means of a razor.

Temperature record of guinea pig 4014: April 8, 102.5. (normal temperature before applying tick feces); April 9, 102 (scratches not visible); April 10, 102.2; April 11, 104.8; April 12, 104.2; April 13, 105.5; April 14, 104.5; April 15, 106.6; April 16, 104.7; April 17, 103.2; April 18, 101.9; April 19, 98.1 (labored breathing); April 20, animal found dead. In 11 days this animal lost 68 grams.

At autopsy the brain was inflamed, and there was a diffuse bronchopneumonia in the lungs. Other organs were negative. No bacteria were isolated from the brain tissue. A 10 per cent brain suspension was then prepared and injected subcutaneously (2 cc) into guinea pig 4017 and intracerebrally (0.03 cc.) into each of 2 mice (cage 3). Both of the mice developed typical signs of lymphocytic choriomeningitis and succumbed in 7 and 9 days respectively. Guinea pig 4017 also developed typical signs of lymphocytic choriomeningitis and succumbed in 12 days. No bacteria were isolated from the brain tissue of guinea pig 4017.

In the successful transmission experiments typical symptoms were produced in all test animals and all animals that died showed typical pathology. Surviving animals in all experiments were shown to be immune to inoculation of the virus of lymphocytic choriomeningitis. As a final proof, the virus was shown to be present in the test animals by inoculation of a guinea pig and several white mice as shown in Figure I. In all experiments bacteriologic studies, conducted aerobically and an-

FIGURE I
TEST GUINEA PIG



aerobically, indicated that only chance contaminants were present occasionally. Inoculation of animals with cultures of these organisms proved them to be non-pathogenic.

CONCLUSIONS

Experimental infection of all stages in the life cycle of the Rocky Mountain wood tick with the virus of lymphocytic choriomeningitis has been demonstrated. Stage to stage transmission of the virus from larvae to nymphs, nymphs to adults, and generation to generation transmission from adults to eggs and larvae has also been shown to occur. Attempts to transmit the infection by feeding adults on normal animals after previously feeding them in either their nymphal or adult stages on infected guinea pigs were uniformly negative. Infection has been transmitted, however, by feeding nymphs which had engorged in their larval stage on an infected guinea pig. Infection has also been transmitted by applying infected crushed ticks or feces from ticks which

had engorged in their previous stage upon infected animals to the scarified skin of guinea pigs.

It is suggested that other blood-sucking arthropods such as culicine mosquitoes, stable flies, and body lice may experimentally transmit the virus of lymphocytic choriomeningitis from rodent to rodent and possibly to man. If infection is transmitted from rodent to man, it is possible that this may occur by means of infected secretions or excretions such as may take place in febrile jaundice rather than by the bite of an arthropod.

REFERENCES

1. Armstrong, C., and Lillie, R. D. Experimental Lymphocytic Choriomeningitis of Monkeys and Mice Produced by a Virus Encountered in Studies of the 1933 St. Louis Encephalitis Epidemic. *Pub. Health Rep.*, 49:1022-1025 (Aug.), 1934.
2. Traub, Erich. An Epidemic in a Mouse Colony Due to the Virus of Acute Lymphocytic Choriomeningitis. *J. Exper. Med.*, 63:533-546, 1936.
3. Findlay, G. M., and Stern, R. O. Pathological Changes Due to Infection with the Virus of Lymphocytic Choriomeningitis. *J. Path. & Bact.*, 43:327-338 (Sept.), 1936.
4. Wooley, J. G., Armstrong, C., and Onstott, R. H. The Occurrence in the Sera of Man and Monkeys of Protective Antibodies against the Virus of Lymphocytic Choriomeningitis as Determined by the Serum-Virus Protection Test in Mice. *Pub. Health Rep.* 52:1107-1113 (Aug.), 1937.
5. Findlay, G. M., Alcock, N. S., and Stern, R. O. The Virus Etiology of One Form of Lymphocytic Meningitis. *Lancet*, 1:650-662 (Mar.), 1936.
6. Lepine, P., and Sautter, V. Existence en France du virus murin de la choriomeningite lymphocytaire. *Compt. rend. Acad. d. sc.*, 202:1624, 1936.
7. Traub, Erich. The Epidemiology of Lymphocytic Choriomeningitis in White Mice. *J. Exper. Med.*, 64:183-200, 1936.
8. Rivers, T. M., and Scott, T. F. McN. Meningitis in Man Caused by a Filterable Virus; II. Identification of the Etiological Agent. *J. Exper. Med.*, 63:415-431 (Mar.), 1936.
9. Jellison, W. S., and Philip, C. B. Technique for Routine and Experimental Feeding of Certain Ixodid Ticks on Guinea Pigs and Rabbits. *Pub. Health Rep.*, 48:1081-1082 (Sept.), 1933.
10. Wolbach, S. B. Studies on Rocky Mountain Spotted Fever. *J. Med. Res.*, 41:64-66 (Nov.), 1919.

The Physician's and the Nurse's Part in Health Education^{*}

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HEALTH education has been claimed to be one of the major functions of each professional group engaged in the school health program. The physicians contend that they should do health education because they know the subject matter; the teachers claim that health education is their function because they know the method; the nurses maintain that they are the logical ones to teach health because, in addition to knowing sufficient subject matter and to having acquired some technics of presentation, they know their families and are in intimate contact with them. Implied in all these contentions is the concept that health education is primarily a matter of instructing parents and children on health subjects. The idea seems to be that if the proper professional worker gives instruction to those needing it, desirable results are assured. But the bare statement of the spoken or written word is not the sole means of bringing about the changes in attitude and behavior which we are trying to effect through our health education. *How* a statement is spoken or

written may have far more significance for the person addressed than actually *what* is said. Actions, too, often confound the words accompanying the action so that the individual may learn something altogether different from what was intended.

So instead of discussing the controversial question of whether health teaching should be done by the physician, by the nurse, or by the teacher, we have chosen to focus attention on the educational possibilities that are inherent in many of the administrative procedures and policies that are part and parcel of our school health programs.

As a background for this discussion it might be well to recall some of the factors with which all of us are familiar that influence *what* and *how* people learn. First, one seldom learns just one thing from even a single experience. Ordinarily a number of things are learned from the same situation. A child not only learns that his skin infection is impetigo when the doctor or nurse examines it and gives him the information; but depending upon the way he is told and the circumstances under which he is told, he may learn that accidental infections occur which do not reflect upon his

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home life, and that the doctor and nurse are his friends, that they will protect him from embarrassment in the presence of his friends and classmates, and that they will help him to get well. On the other hand, he may learn that the physician and nurse have no concern for his feelings, for they do not hesitate to tell him in the presence of other children that the infection is associated with dirt, or that he is unfit to be with his friends; he may even get the implication from conversations that he overhears in the medical room between doctor, nurse, and teacher that his home is responsible for his condition. Thus in the latter case he learns to fear the medical room and to resent these people who attack his fortress of inner security—his home.

Children and adults, who after all follow very much the same principles in learning, undergo at least three definite forms of change in each learning situation: (a) They learn the words that were spoken. (b) They learn to react emotionally to the way the total situation was handled. (c) They learn what action to take in the future to obtain any satisfactions that were present or what to do to avoid any unpleasantness that was inherent in the situation. Thus a wealth of attitudes, biases, hates, fears and prejudices are developed in every individual, and these are often found to have their origin in situations where the obvious intention of the teaching was far different.

Corollary to this principle is the fact that it is not necessary that something be done to or for an individual in order that he may learn. He frequently learns when we as teachers think we have done nothing to or for him. This is particularly true with reference to the development of attitudes. Providing a comfortable, quiet place where a mother may sit to discuss the health problems of her child

with the doctor, conserving the mother's time through carefully planned appointment systems, etc., are examples of situations in which parents learn to appreciate the school health services, whereas failures to keep appointments with parents or children, advising them to go to clinics where the waiting list cannot possibly admit another person, and giving a medical examination without an explanation to the parent of what was or was not found are very likely to develop in the parents and children negative attitudes that often seem irrational to the staff.

In the light of the certainty with which learning other than that specifically intended takes place in various situations, let us examine some of the school health procedures to discover the possibilities for both positive and negative education that they present.

First of all, the initial as well as every contact of a parent or child with the physician and nurse is fraught with educational possibilities. Usually the first contact of the parent with a physician or nurse is a note either requesting the parent to take his child to a physician for an examination or inviting him to be present at the school examination of the child. Do physicians and nurses analyze such messages sent to the home to see that they accomplish the real objectives of the school health service? Is the manner in which the note is sent and the wording of it such that the parents are convinced that the request is made because the school has a vital interest in the child's health, or do the parents learn from the note that the school health service is merely carrying out a routine service without much thought as to the circumstances governing the lives of the family?

To make the point more concrete consider the following extreme example which is an actual case. "Come to

school at 9 A.M. to see me" signed "School Nurse" was hurriedly written on a scrap of paper left undated, folded, given to a boy with the command "Take that home to Mother." If such a note survives the usual vicissitudes of messages given to little boys and reaches its destination, is it likely to start a chain of events in which the parent will understand that a specific problem is to be discussed with her, will she keep the appointment with the nurse, and expect professional guidance which she may trust?

Consideration for the way in which notes are worded, who sends them home, and the method of sending them, has been experimentally shown by the New York City Study to influence the response which is obtained. One type of note resulted in a 30 per cent response from the parents. A more carefully planned note caused 85 per cent to respond to the message sent home.

The next most common experience of the parent and child with the school health service from which much positive or negative health education takes place is the visit to the medical room to see the doctor or nurse. Even the room itself can affect the parents' and children's attitudes toward, and conceptions of the school health service. If the medical quarters are clean, well lighted, well ventilated, if they have adequate room for all those who are visiting it at one time, and if there are sufficient chairs for those who must wait for short periods, other things being equal, favorable attitudes toward the health work of the school will be developed. But if, as so often happens, the physician and nurse must work in a niche in a corner, or in an empty classroom vacated because of its lack of light, the unlikely stage set will not promote a confidence in medical service or build a respect for the confidential trustworthy relationships be-

tween patient and physician which we claim we are trying to build up.

Although the physical lay-out of the medical quarters and the comforts or inconveniences that the child and parent experience while waiting in them have important influence on learning, the treatment accorded them by the doctor and nurse during the examination and accompanying interview is far more potent in determining what they learn. Are they greeted courteously? Are explanations made carefully if unexpected delays occur? Is the mother made to feel that her presence is not only welcome, but important? These are the factors that build attitudes. This, of course, is no new thought, for all school health workers have stressed the possibilities for educating both parent and child at the time of the medical examination. But in our observations of some of the examinations in various school systems, we have been led to wonder if the possibilities for learning the wrong attitudes and the wrong health behaviors from our routine procedures have been fully recognized.

Do we always recognize that the things we do not tell the parent but which are implied by our actions, lead him to form many erroneous convictions and may bring about negative attitudes toward the school health service? Perhaps an extreme situation will emphasize this point. Consider the mother who observes the examination with a stethoscope of the chest of her only child. The doctor listens—he listens again—he frowns—listens again. He has the child lie down on a couch, and listens several times, shakes his head, then listens a second time with the child standing. The mother suspecting something anxiously asks "What is the matter, Doctor?" Not wishing, without a cardiograph and more adequate examination to make a diagnosis of the heart murmur he has

heard, the doctor answers, "The nurse will tell you what to do." The nurse according to the prescribed policy gives the mother a printed slip and says in a routine fashion, "Take this slip with you and take John to your private physician. Don't worry about it." The mother looks at the slip. On it is written "cardiac" with a question mark after it.

Now more concerned than ever, having no family physician and having received no instruction in the selection of one, the mother finds a doctor's sign on the way home and decides to take Johnny there that night. The doctor after no more careful examination than was given at the school tells her that Johnny has a little heart murmur but it amounts to nothing. He further tells her that the school should have told her that it was nothing at the time.

Now what did that mother learn? First of all she learned that the school physician did not tell her all he knew. She also learned that the private physician had little respect for the school physician and the way he handled the situation. She learned to pay little attention to the advice and instruction from the school medical service. She may have learned that the school health service made her spend money for an examination that she would not have spent if she had not come in contact with it. Nor did she have the positive learning experience of finding out what a good cardiac examination is like. On the other hand, she went through an experience with considerable negative emotional content and will no doubt tell it over and over to other mothers who have children in school. Thus she becomes a negative agent of health education not because of instruction that was given her but because the school doctor in examining her child followed prescribed medical technics, but overlooked the effect of

those technics on the personalities with which he was dealing.

In recounting this incident we are aware of the pressure placed upon physicians and nurses to examine a large number of children within a very short time. We are also aware of the many restrictions that policies place upon them with reference to usurping the functions of the private physicians. However, we have given the incident in the extreme to show how negative health education may result if proper consideration is not given to the attitudes and ideas that are outcomes of the procedures which we use.

If the parent has not been present at the examination and some condition needing medical attention has been found, opportunities for negative or positive education occur in the follow-up procedures. The methods used may include a note to the parent, a home visit by the nurse, a consultation in school, or contacting the child in school. Whatever the procedure, the information given should be positive and backed by sufficient reason to convince the parent that medical care is needed. All of you are familiar with the situations frequently arising during the follow-up, when the private physician or clinic disagrees with the findings of the school physician. It is recognized that disagreements in diagnosis are sure to arise, but do we consider what such disagreements teach the families with which we are working? Too often we concern ourselves only with the administrative relationships which hamper our work, and fail to recognize the effect of such situations on those who are the objects of our endeavor.

The description of these difficulties by no means suggests the solution. It does, however, point out the possibilities for negative education presented by the school health service, and what may be learned as a result of some of the

administrative procedures and policies under which the school physician and nurse must work. Although we are not in a position to suggest the proper procedures, it is our conviction that administrative policies and procedures should be influenced far more by the ideas and attitudes they engender in the parents and children than by immediate administrative exigencies of the situation.

In summary, then, there are many situations in the school health program involving the physician and the nurse that abound with teaching possibilities. If in these situations the procedures followed by the physicians and nurses bring pleasant experiences to the parents and children and satisfy their

wants and needs, much good health education will result; favorable attitudes toward proper attention for the immediate health problem as well as toward the future use of medical care will be built up. If, on the other hand, the school health procedures are carried on in a routine and regulatory fashion without regard to the feelings, the wants, the comfort, and the understanding of both parents and children, much negative learning is likely to take place. Therefore, one of the contributions of the physician and the nurse to health education is to make sure that all of their procedures and methods result in positive rather than negative learning on the part of their clientele.

Bacteriological Tests on Mechanical Dishwashers for Home Use

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MUCH attention has been given to the public health aspects of dishwashing in large establishments whereas comparatively little attention has been given the domestic problem. Since mechanical dishwashers designed for domestic purposes are now coming into use, it is necessary, for an evaluation from the public health standpoint, that scientific information be obtained concerning their effectiveness in removing bacteria from soiled dishes. Therefore, the purpose of this investigation was to determine, under controlled laboratory conditions, the amount of bacterial residue remaining on dishes after washing in two domestic dishwashers.

Machine A, the smaller, opened from the front and contained a sliding rack for holding the dishes in position during the washing procedure. Machine B opened by a hinged top and contained a double rack for utensils. Both machines had fully enameled one piece tubs with drains operated by exterior control knobs. An impeller, electrically driven, was used in both machines to throw the water across the surfaces of the dishes and remove the food soil. Water at 150° F. (65.6° C.) entered the machines through a spray mechanism situated above the dasher. Machine A held 5 quarts of water and B held 4 quarts of water during the wash period. Detergents compounded without soaps were used in the washing procedures.

METHODS

Dishes were soiled with several types of food to simulate natural conditions. Soft boiled eggs (thoroughly minced), melted Crisco and cooked Farina were used. Suspensions of the test bacterium were added to these materials, a thorough mixing performed, and the resulting mixtures spread on the top surfaces of the dishes in a layer as nearly uniform as possible. The egg and Crisco soils were dried on the dishes for 30 minutes before washing. Dishes soiled with Farina were washed immediately after contamination. Glasses, cups, and silverware were soiled with a neutralized nucin suspension of bacteria. This material was likewise allowed to dry for 30 minutes before washing.

Calgonite (an alkaline material containing sodium hydroxide, trisodium phosphate, sodium metasilicate, and sodium hexametaphosphate) and trisodium phosphate were the detergents tested in the machines. The standard washing procedure consisted of: (1) a preliminary 10 second spray rinse with the drain open, (2) a 5 minute wash with the drain closed, (3) a 10 second spray rinse with the drain open, (4) a ½ minute rinse with the drain closed (first rinse), (5) a 10 second spray rinse with the drain open, (6) a final rinse of 1 minute with the drain closed (second rinse). At the end of this period the dishes were allowed to cool

for a few minutes before examination was begun.

Examination of the utensils was accomplished by a swabbing process. The entire front surface of all dishes such as plates, and the parts of glasses, cups and silverware normally coming into contact with the food or mouth were tested. Swabs, made up on applicator sticks, were sterilized in nutrient broth tubes (5 cc. per tube) and washed off in this broth after use. A portion of the latter was plated into suitable media to allow a count to be made. In some instances dishes in various portions of the machines were replaced with glass discs. After the soiling and

washing procedures these discs were placed in large Petri dishes and washed off with melted agar. This gave an insight into the efficiency of the swabbing procedures. Veal infusion agar was used to test for *Eberthella typhosus* and *Staphylococcus aureus* while blood agar was used for streptococci. In testing for *Mycobacterium tuberculosis*, inoculations were made subcutaneously into the groin of guinea pigs. All plates were incubated at 37°C. for 48 hours.

EXPERIMENTAL

Food soil, to which a suspension of *Bacterium typhosum*, *Staphylococcus aureus* or *Streptococcus pyogenes* had

TABLE I

Summary of Results Obtained by Machine Washing with 0.3 Per cent Calgonite

<i>Bacterium</i> <i>Food Soil</i> <i>Machine</i>	<i>Staphylococcus aureus</i> <i>Egg</i>		<i>Staphylococcus aureus</i> <i>Crisco</i>		<i>Eberthella typhosus</i> <i>Egg</i>		<i>Streptococcus pyogenes</i> <i>Egg</i>		<i>Staphylococcus aureus</i> <i>Farina</i>
	A	B	A	B	A	B	A	B	A
Sterile dishes *									
Per cent sterile after:									
wash	10	17	—	—	—	—	—	—	—
1st rinse	15	25	—	—	—	—	—	—	—
2nd rinse	32	70	63	56	72	99	51	89	99
Average number of bacteria per dish remaining contaminated after:									
wash	14	16	—	—	—	—	—	—	—
1st rinse	4	5	—	—	—	—	—	—	—
2nd rinse	6	3	7	2	2	0	4	3	0
Maximum number of bacteria per dish remaining contaminated after:									
wash	17	20	—	—	—	—	—	—	—
1st rinse	8	8	—	—	—	—	—	—	—
2nd rinse	7	8	32	8	5	1	8	3	1
Soiled dishes									
Per cent sterile after:									
wash	10	20	—	—	—	—	—	—	—
1st rinse	20	70	—	—	—	—	—	—	—
2nd rinse	30	77	50	61	60	90	50	90	79
Average number of bacteria per dish remaining contaminated after:									
wash	412	502	—	—	—	—	—	—	—
1st rinse	8	16	—	—	—	—	—	—	—
2nd rinse	7	8	11	10	6	4	4	4	5
Maximum number of bacteria per dish remaining contaminated after:									
wash	2,400	3,200	—	—	—	—	—	—	—
1st rinse	16	32	—	—	—	—	—	—	—
2nd rinse	12	28	21	56	10	4	20	6	16

* Sterile dishes were introduced into machine with soiled dishes.
— indicates no tests made.

been added, was put on sterile dishes and the latter washed in the machines. Glasses, cups, and silverware were not soiled at this time, but they, along with other dishes, were tested by the swab method at the end of the wash period. This was done to determine the amount of transfer that occurred from the contaminated to the sterile dishes. Tests were also made to determine the efficiency of the wash and rinse procedures. In such tests the dishes were swabbed at the conclusion of the 5 minute wash period, after which the experiment was begun anew, and tests made at the end of the first and second rinses in a similar fashion. As would be expected the first rinse is quite effective in removing contaminating organisms. Calgonite, in 0.3 per cent concentration by weight, was used in obtaining the results tabulated in Table I. The heading, "Sterile Dishes," in that table is used to indicate glasses and cups that were put into the washer in a sterile condition along with the soiled dishes.

In those experiments in which glass discs were substituted for dishes, the results showed the swab method to be approximately 50 per cent efficient in recovering organisms from contaminated surfaces when only small numbers were involved. Thus, those dishes listed as "Sterile" in Table I and subsequent tables may or may not be in this condition. However, the majority

of the results in the literature are based upon a swab method of recovery. These data are in agreement with those of Fellers, Levine, and Harvey.¹

Staphylococcus aureus withstood the washing procedure better than either *Streptococcus pyogenes* or *Eberthella typhosa*. According to Devereux and Mallman,² Calgonite is quite effective as a germicide against *Escherichia coli* but it has little or no effect on *Staphylococcus aureus*. Our results support this observation. When bactericidal tests were made at 140° F. (60° C.) by *in vitro* methods, the effect of heat overshadowed any possible effect of the detergent and all organisms of the three types tested were killed in from 5 to 7 minutes. Varying the degree of hardness of the water with either detergent gave no alteration of these results. However, in both the A and B machines the water was cooled to such an extent by the dishes that only the second rinse water in machine A reached 141.8° F. (61° C.), while that in the larger machine B only reached 135° F. (57.2° C.). Tests made at a temperature of 122° F. (50° C.) showed viable organisms present at the end of 10 minutes.

When trisodium phosphate was substituted for Calgonite and a large number of washings made over a period of time, with no sterilization of the machine or dishes during such a period, a noticeable film formed on the

TABLE II

Viable Bacteria on Cups, Glasses, and Silverware Soiled with a Neutralized Mucin Suspension of Staphylococcus aureus and Washed by the Standard Procedure in Machines A and B

Type of Utensil	Per cent Dishes Sterile		Average Number of Bacteria per Dish Remaining Contaminated		Maximum Number of Bacteria per Dish Remaining Contaminated	
	A	B	A	B	A	B
Glass	77	74	7	6	24	20
Cup	80	72	5	7	8	16
Knife	83	61	6	6	8	20
Fork	92	80	8	5	8	8
Spoon	83	80	6	4	8	8

utensils. This was especially noticeable on the glasses. Bacteriological methods in which the film was completely broken up did not show that there was any noticeable accumulation of bacteria as has been reported by Hall,³ Hall and Schwartz,⁴ and Cox.⁵ These workers were not concerned with a specific bacterium of a pathogenic type, so it is entirely possible that other types of bacteria normal to air, water, etc., would accumulate in such a film. It is doubtful, though whether they would be capable of growing in a film of this type. Recently, Hall⁶ reported on the use of a milk culture of *Staphylococcus aureus* as a soiling agent. The dishes were washed with a trisodium phosphate detergent and the film was definitely found to contain bacteria. However, to quote from Halvorson, Bayliss, Ordall, and Wilson⁷: "The type and extent of the deposits formed depends upon the water hardness and temperature, the type of soil, the nature of the surface being cleaned, the soap and buffers used, the washing procedure, and other such factors."

In order to gain an idea as to the relative efficiency of the machines in contrast to hand washing procedures, dishes were soiled with bacteria-food mixtures and washed by hand, using a common brand of flake soap. The wash and rinse waters were adjusted to an initial temperature of 120° F. (48.9° C.). The swab method of testing was used. All the dishes remained contaminated, but to a varying extent. As an example, there was an average of 26 bacteria for each of the soiled dishes after rinsing and air drying in contrast to 11 when identical mixtures were used for soiling and the dishes washed in a machine. Sterile cups, run through the wash and rinse water, retained an average of 18 organisms in contrast to 7 when washed in a machine.

Cups, glasses, and silverware were soiled with *Staphylococcus aureus* suspensions in neutralized mucin and washed by the standard procedure using Calgonite (see Table II). In experiments of this type all other dishes were placed in the machines in a sterile condition so that the transfer from plates, etc., as previously shown in Table I, would be eliminated. The maximum number of bacteria per utensil was never greater than 24 when tested by the swab procedure. A large majority of the dishes appeared to be sterile.

In view of the possible dissemination of tubercle bacilli by contaminated utensils and considering the resistance of this organism, it was thought that results of some significance could be obtained by using such an organism in the food soil. The H37 strain of the human tubercle bacillus was grown on Lowenstein's medium, ground in a mortar with sterile reagent sand, and mixed with finely divided egg material. Dishes were soiled in the usual fashion. Tests were made of the preliminary spray rinse, of the main wash water, and of the dishes. In the latter tests 5 of one type of dish were swabbed with a single swab. The swab was rinsed in 4.0 cc. of sterile saline after each dish was examined. Guinea pigs were inoculated subcutaneously into the groin with the test material. The materials containing Calgonite were neutralized before being injected. Results are given in Table III.

From Table III it is apparent that the organism causing human tuberculosis can withstand the washing procedure and still be present in small numbers on eating utensils.

Although both machines had fully enameled one piece tubs, there were certain regions where accumulation of food soil and bacteria might occur. These regions were checked by a process of cumulative washing in

TABLE III

Recovery of *Mycobacterium Tuberculosis* from Dishes Washed in Machines A and B with Calgonite Detergent

Material	Inoculum	Number of Guinea Pigs Used for Each Machine	Number of Guinea Pigs with Tuberculosis	
			A	B
	cc.			
Preliminary spray rinse	0.2	10	8 x	10
Wash water	1.0	10	10	9 x
Swab material from:				
Plates	1.0	2	2	1
Saucers	1.0	2	1	0
Bread dishes	1.0	2	0	1
Salad dishes	1.0	2	1	1
Sauce dishes	1.0	2	2	2

x = others died within 7-10 days after inoculation from other causes.

which dishes were washed several times daily for periods of 1 week with no sterilization or cleaning of the machine during the period. Egg soil containing *Staphylococcus aureus* was used in these tests. Machine A showed some accumulation beneath a door stop of rubber and around a perforated plate over the drain valve. In machine B the greatest and only accumulation of importance was on a portion of the groove in which the lid gasket rested. However, there was no evidence of bacterial growth or odors in the sections where accumulation occurred.

SUMMARY

Two mechanical dishwashers designed for domestic purposes were subjected to rigidly controlled tests for the removal of bacteria from dishes contaminated with food soils consisting of one of the following: egg, fat (Crisco), wheat cereal (Farina), and neutralized mucin. The food soils were inoculated with one of the following bacteria: *Staphylococcus aureus*, *Eberthella typhosa*, *Streptococcus pyogenes*, and *Mycobacterium tuberculosis*. For comparative purposes dishes similarly soiled were washed by hand in water to which a common brand of soap had been added.

Dishes washed in the two machines were not sterile but had fewer residual bacteria than those washed by a hand

procedure. The numbers of residual bacteria are apparently reduced by a mechanical washing-away action and not by the temperature of the water or any great germicidal effect of the detergents. According to Behrend,⁸ utensils yielding a count of from 1 to 10 bacteria may be classified as excellent, from 11 to 30 good, from 31 to 50 fair, from 51 to 100 poor, and more than 100 bad. On this basis the machines on the average, when used according to standard procedures, gave excellent results.

The ideal dishwasher from the public health standpoint is one which will remove all pathogenic microorganisms from dishes. At present certain technical difficulties interfere with the achievement of that goal.

REFERENCES

1. Fellers, C. R., Levine, A. S., and Harvey, E. W. Bacteriologic Examination of Glassware or China for Sanitary Quality. *A.J.P.H.*, 26:1211, 1936.
2. Devereux, E. D., and Mallman, W. L. Efficiency of Methods and Products for Sterilization of Beverage Glasses. *A.J.P.H.*, 26:165, 1936.
3. Hall, G. O. The Role of Sodium Hexametaphosphate as an Aid in Sanitation. Thesis, University of Pittsburgh, 1932.
4. Hall, G. O., and Schwartz, C. Sanitary Value of Sodium Metaphosphate in Dishwashing. *Indust. & Eng. Chem.*, 29:431, 1937.
5. Cox, W. C. Use of Dishwashing Machines: Pasteurization of Eating Utensils. *A.J.P.H.*, 29:174, 1938.
6. Hall, G. O., and Schwartz, C. Sanitary Value of Sodium Metaphosphate in Dishwashing. *Indust. & Eng. Chem.*, 30:23, 1938.
7. Halvorson, H. O., Bayliss, M., Ordal, E. J., and Wilson, J. L. Germicidal Detergents. *Soap*, May, 1935.
8. Behrend, B. Making Use of Science in Restaurant Inspection. *Hygia*, Oct., 1929, p. 985.

Active Immunization Against Diphtheria

The Efficacy of Several Methods Used in a City of Medium Size

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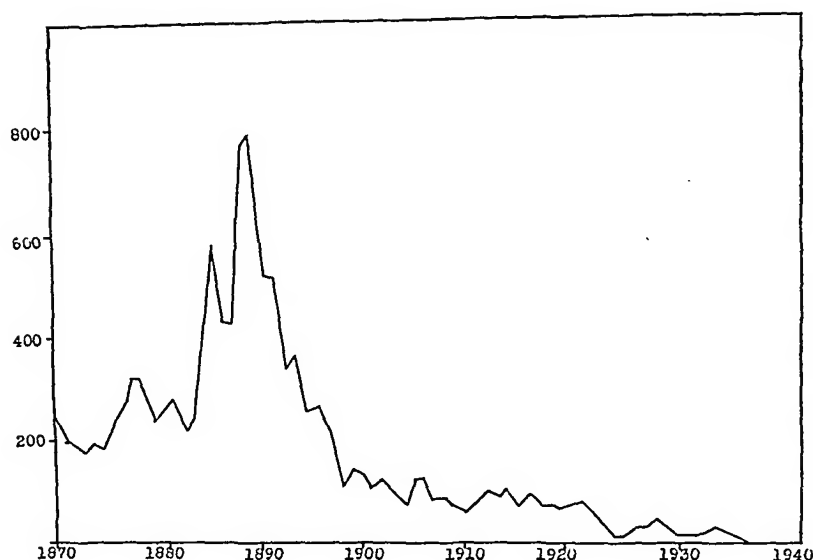
DURING the last five decades there has been a decline in the mortality from diphtheria. Figure I, beginning with the year 1870, shows Cincinnati's crude mortality in children under 10 years of age. A peak was reached in 1890.

Morbidity records are less accurate than mortality statistics, but the general trend of diphtheria morbidity in Cincinnati during the last three decades has been downward. There was an acceleration of this downward trend in 1928 and 1929 when the first local large scale immunization program was inaugurated. This result was encouraging although the decline was not greater than that which had occurred at previous times when active immunization had not been employed. Toxin antitoxin was the first antigen used. Sometimes 3 and sometimes 4 injections were given at intervals of 1 week. Two injections of formolized toxoid, 1 week apart were substituted in 1932. In 1934, the single injection of alum precipitated toxoid was given, and in 1936, this was changed to 2 injections of alum

precipitated toxoid at an interval of 4 weeks. Innovations in antigen and the number of injections have been introduced so rapidly that the merits of the various methods have not been completely evaluated.

Efforts should be made to determine accurately whether the decline in diphtheria has been produced by control measures or by unknown factors governing the natural cycles of the disease. Lucia and Welke¹ made a comparison between mortality trends in Providence, R. I., where there had been a vigorous campaign for immunization against diphtheria, and San Francisco, Calif., where there had not been such an active campaign. The trends in both cities were similar. Woods² showed that in England the decline in mortality from diphtheria was similar to that from scarlet fever although no large scale immunization measures against scarlet fever had been carried out. On the other hand, experience in institutions, Young and Cummings,³ in schools, Park,⁴ and in health districts, Gundel,⁵ indicates that active immunization has helped in reducing the incidence of diphtheria.

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Diphtheria Mortality for Cincinnati, Ohio, Rates per 100,000 Under 10 Yrs. of Age - 1870 - 1937.

Figure I

EPIDEMIOLOGY OF DIPHTHERIA

Resident cases for the years 1932-1937, were studied. The population figures used were those obtained in a local census in the year 1935.

Distribution by Season, Sex and Age—In Cincinnati, the epidemiology of diphtheria has generally conformed to the usual pattern. The peak incidence has been reached in late autumn and early winter. In the earlier years of life, both sexes have been equally affected. In the few cases which have occurred after 20 years of age, there

has been the well known preponderance of the disease in females because of their close association with children. In relation to age, the greatest incidence of cases and deaths has been in the late preschool and early school years.

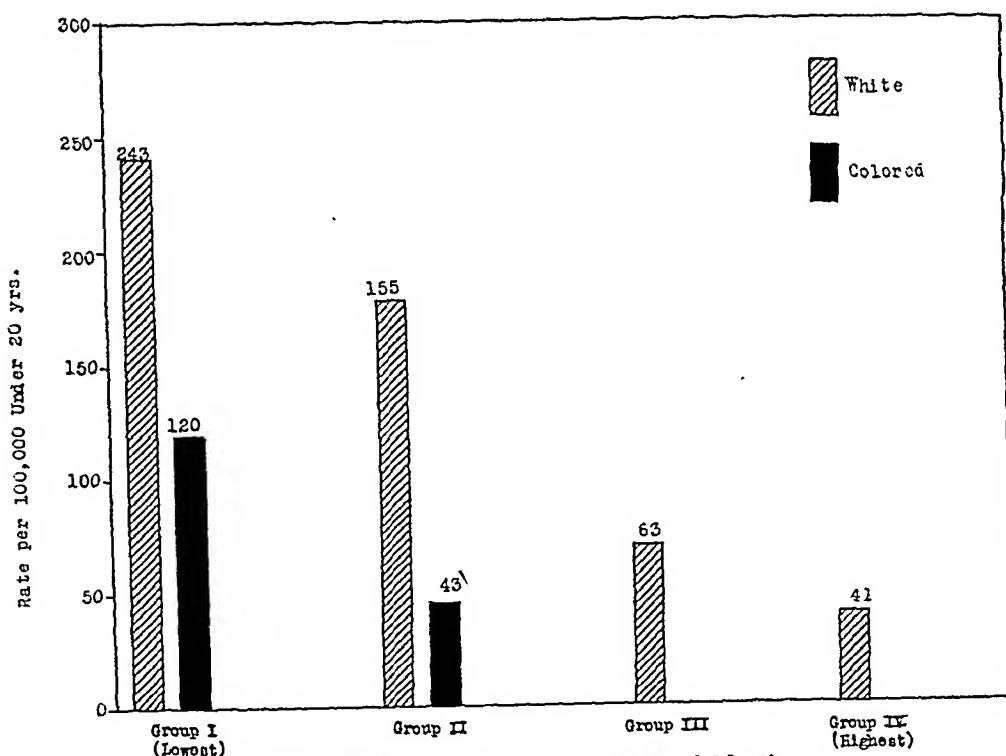
Distribution by Economic and Racial Groups—These two topics may be appropriately considered together. Cincinnati's area has been divided into 107 census tracts, and these in turn fall into 4 economic groups, based on average rentals. The populations of the 4 groups are approximately equal.

TABLE I

Distribution of Diphtheria in White and Colored in Relation to Economic Level

Economic Group	White			Colored		
	Population Under 20 Yrs. of Age in 1935	Total Resident Cases Under 20 Yrs. of Age in 1932-1937	Average Yearly Rate per 100,000 Under 20 Yrs. of Age	Population Under 20 Yrs. of Age in 1935	Total Resident Cases Under 20 Yrs. of Age in 1932-1937	Average Yearly Rate per 100,000 Under 20 Yrs. of Age
I (Lowest)	27,631	403	243	11,075	80	120
II	30,906	288	155	5,024	13	43
III	30,925	117	63	1,938	8	69 *
IV (Highest)	30,481	75	41	460	2	72 *

* Omitted in preparation of Figure II because of questionable validity.



Distribution of Diphtheria by Economic Groups - White and Colored.
Morbidity Rates per 100,000 under 20 years of age - Six Year Average.

(Colored Rates have not been shown for Groups III and IV because of questionable validity.)

Figure II

Group I is the lowest and Group IV is the highest in respect to economic well-being.

Table I and Figure II show that diphtheria like tuberculosis, is a disease associated with poverty. It is also indicated that the white race is more susceptible to diphtheria than the colored. A comparison of the total white and colored populations under 20 years of age would not have been valid because most of the colored population is in the lower economic groups.

The preponderance of diphtheria in economic Groups I and II cannot be attributed to neglect of inoculations. The Health Department and other agencies have provided free inoculations in these groups while Groups III and IV have been cared for by private physicians.

DIPHTHERIA DESPITE INOCULATION

Cases of diphtheria occur even in

those inoculated. The term inoculation rather than immunization is used for the reason that the latter implies that the desired result has been obtained. From the data available, it is impossible to tell which of the standard antigens has been most efficacious. Cases of diphtheria have occurred after the administration of all of them. Many occurred within a year after the administration of the antigen. The failure to prevent diphtheria in these instances, therefore, cannot be attributed to loss of immunity over a long period of time.

The fact that attempts to immunize against diphtheria sometimes fail is not of recent discovery. Park⁴ pointed out that even in children with negative Schick tests, naturally or artificially produced, the incidence of diphtheria was decreased but the disease was not entirely eliminated.

Do those who have contracted diph-

TABLE II

Cases Under 20 Years of Age in Which a Definitely Positive or Negative History of Previous Inoculation Could Be Obtained

	Cases	Deaths	Fatality Rate Per cent
Not Inoculated	474	22	4.64
Inoculated	238	11	4.62

theria despite inoculation have milder cases? Fatality rates in non-inoculated and inoculated children (under 20 years of age) are shown in Table II. The difference was not significant. The only cases considered were those in which it was possible to get a definite yes or no answer to the question concerning previous inoculation. All cases in inoculated children were considered in one group regardless of the antigen used because there were not enough cases to consider mortality in respect to each type of antigen. Cases developing within 6 weeks after completion of inoculation and cases in which the full course of inoculations had not been completed were considered as non-inoculated.

When diphtheria has developed in previously inoculated children, physicians have not delayed in giving antitoxin. The average interval between onset of sickness and administration of antitoxin was slightly shorter in inoculated than in non-inoculated children.

The incidence of diphtheria in inoculated and non-inoculated children of the same race and comparable economic levels could not be calculated because of lack of accurate data concerning the number and distribution of the inoculations. Of the cases of diphtheria in the 238 previously inoculated children 195 (81.9 per cent) were in the low economic groups, I and II. The distribution of the cases in inoculated children was similar to the general distribution where 784 (79.5 per cent) of the 986 cases in children were in the same low economic groups.

ARTIFICIAL AND NATURAL IMMUNITY AS MEASURED BY THE SCHICK TEST

It has been shown by Guthrie, Marshall, and Moss,⁶ Park,⁴ and others that the Shick test is a fairly reliable method of measuring immunity to diphtheria. Jensen⁷ and Brandon and Frazer⁸ have recently and more accurately determined the approximate level of blood antitoxin which is necessary for a negative Schick test.

As an individual goes through life, he has exposures to the diphtheria bacillus, frequently in the city, less frequently in rural areas. Active immunization should be carried out early in life in order that early exposures to the diphtheria bacillus may stimulate higher levels of immunity rather than produce the disease. The duration of artificial active immunity will depend to some extent upon the frequency of subclinical infections. Therefore, in comparing the duration of immunity conferred by various types of inoculations, strictly comparable groups must be studied. Rural and even suburban populations must not be compared with urban populations because the frequent subclinical infections in crowded areas produce a prolongation of artificial immunity that cannot be expected in more sparsely populated areas.

In this Shick test survey two neighboring suburbs, M. and E.E., were studied during the school year 1935-1936. Both suburbs were relatively homogenous areas, intermediate between rural and urban. A control group and groups of children who had received various numbers of injections of various antigens without preliminary Schick tests were used. The findings in the various groups were not exactly comparable because the intervals of time between the administration of the various antigens and testing were not always the same. Nevertheless, it was possible to reach certain conclusions. The results are given in Table III.

TABLE III

Schick Tests in a Relatively Homogenous Suburban Area—Groups of Children Who Had Received Various Numbers of Injections of Various Antigens and a Group Who Had Received None

	Children in Group	Schick Positive		Schick Negative		Interval between Inoculation and Schick Test in Years	Mean Age in Years at Time of Schick Test
		Number	Per cent	Number	Per cent		
Non-Inoculated (Controls)	544	359	66	185	34		11.22 \pm .09
Toxin-Antitoxin (4 Injections)	208	60	29	148	71	6	10.80 \pm .09
Toxin-Antitoxin (3 Injections)	735	253	34	482	66	4-7	10.93 \pm .08
Ramon Toxoid (2 Injections)	650	297	46	353	54	2-3	7.66 \pm .06
A. P. Toxoid (1 Injection)	219	45	21	174	79	1 or less	6.50 \pm .15
Total Tested	2,356						

Schick test readings which gave prolonged nonspecific reactions (about 5 per cent) were not included.

Each of the groups of inoculated children showed a definitely higher level of immunity than the control group. This was particularly significant because the controls were older and therefore had a higher level of natural immunity. The relatively good results in the group which received one injection of alum precipitated toxoid may have been due to the short interval of time between inoculation and testing. The somewhat poorer results in the group which received two injections of formalized toxoid may have been due to the younger age of the members of that group, or to the fact that they received only 2 injections 1 week apart. The results in the group which received toxin-antitoxin were relatively final and represented the resultant immunity status after primary stimulus and natural immunization had reacted over a substantial period of years. There was no significant difference between the immunity levels of those who received 3 injections of toxin-antitoxin and those who received 4.

DISCUSSION

No actively immunizing agent provides perfect protection against diphtheria. This is not surprising in view of the fact that the disease itself does not provide complete protection against subsequent attacks.

The results of this survey indicate that any one of the standard antigens properly given produces an immunity level higher than the level in similar controls. There is no clear-cut evidence that the immunity level produced by any particular antigen is higher or more lasting than that produced by the others. Much accurate data must be accumulated over a long period of years before the final answer concerning the best method can be given.

The findings of Wells, Graham, and Havens,⁹ Friedman,¹⁰ Graham, Murphree, and Gill,¹¹ and Saunders¹² confirm the opinion that inoculation with alum precipitated toxoid is the best single injection method of immunization. We have, therefore, continued its use, supplemented by a second injection. It is desirable to do as complete a job as possible with the first injection because indifferent and care-

less mothers sometimes fail to bring their babies back for subsequent treatments.

There are several reasons for giving a second injection of antigen. First, the reports of Bousfield¹³ cast doubt upon the efficacy of the single injection, even of alum precipitated toxoid. Second, the work of Pansing^{14, 15} indicated that the duration of immunity is longer in children who have received two injections of alum precipitated toxoid. This is particularly significant because Pansing has worked in a rural area where efforts to produce immunity have not been helped along by frequent subclinical infections. Third, the animal experiments of Glenny and Südmersen¹⁶ indicate the value of secondary stimulus. If their observations are to be extended to human beings, the interval between injections should be moderately long—at least 4 weeks.

Since May, 1936, we have been using two injections, 1 cc. each of alum precipitated toxoid at an interval of 4 weeks. This is essentially the procedure which Park¹⁷ has advocated. A few cases of diphtheria have developed even after this treatment, but it is too soon for an evaluation of the results. Schick tests on a little over 100 preschool children in suburb M, indicate that 90 per cent are Schick negative 3 months after the second injection of alum precipitated toxoid.

CONCLUSIONS

1. The morbidity and mortality from diphtheria are declining. Artificial immunization has probably accelerated these declines.

2. Several injections of antigen give better immunization than a single injection. In the case of toxin-antitoxin used in a suburban area there is a leveling off after 3 injections. Four injections do not give significantly better results.

3. Cases and deaths from diphtheria occur even after inoculation. So far,

there is no definite evidence that such cases are less severe than cases in non-inoculated children.

4. Diphtheria affects predominantly the children of poor white parents. In the control of the disease, the improvement of living and housing conditions is important.

REFERENCES

1. Lucia, E. L., and Welke, H. F. Trends in Prevalence of Diphtheria. *J. Infect. Dis.*, 58:306-317 (May-June), 1936.
2. Woods, H. M. Statistical Study of Scarlet Fever and Diphtheria, with Special Reference to Change in Age Distribution of Mortality; Effect of Isolation on Prevalence and Mortality from Scarlet Fever. *J. Hyg.*, 28:147-162 (Nov.), 1928.
3. Young, C. C., and Cummings, G. D. Ten-year Study of Toxin-Antitoxin Mixture and Schick Test in Control of Institutional Diphtheria. *A.J.P.H.*, 22:1151-1156 (Nov.), 1932.
4. Park, W. H. Toxin-Antitoxin Immunization Against Diphtheria. *J.A.M.A.*, 79:1584-1591 (Nov. 4), 1922.
5. Gundel, M. Die aktive Schutzimpfung gegen Diphtherie und die Ergebnisse der in den Jahren 1934 und 1935 in Deutschland durchgeführten Diphtherieschutzimpfungen. *Veröffentl. a.d. Geb. d. Volksgesundheitsdienstes*, 47:385-600, 1936.
6. Guthrie, C. G., Marshall, B. C., and Moss, W. L. Experimental Inoculation of Human Throats with Virulent Diphtheria Bacilli. *Bull. Johns Hopkins Hosp.*, 32:369 (Dec.), 1921.
7. Jensen, C. Rapport entre la réaction de Schick et le taux d'antitoxine dans le sang. *Compt. rend. Soc. de biol.*, 108:539-542 (Nov. 6), 1931.
8. Brandon, K. F., and Fraser, D. T. Observations on Interpretation of Schick Tests; Comparison of Schick Test Interpretations Using Different Products on Same Individual Simultaneously. *J. Immunol.*, 31:387-399 (Nov.), 1936.
9. Wells, D. M., Graham, A. H., and Havens, L. C. Diphtheria Toxoid Precipitated with Alum; Its Preparation and Advantages. *A.J.P.H.*, 22:648-650 (June), 1932.
10. Friedman, L. S. Use of Alum Precipitated Toxoid in Diphtheria Immunization. *J. Med.*, 16:467-476 (Nov.), 1935.
11. Graham, A. H., Murphree, L. R., and Gill, D. G. Diphtheria Immunization with Single Injection of Precipitated Toxoid. *J.A.M.A.*, 100:1096-1097 (Apr. 8), 1933.
12. Saunders, J. C. Alum-precipitated Toxoid in Diphtheria Prevention. *Lancet*, 1:1064-1068 (May 1), 1937.
13. Bousfield, G. Diphtheria Immunization: Plea for Immediate Abandonment or Control of "One-shot" Treatment. *Med. Off.*, 57:15-16 (Jan. 9), 1937.
14. Pansing, H. H., and Shaffer, E. R. Detailed Study on Diphtheria Immunization, with One Dose Alum Precipitated Toxoid. *A.J.P.H.*, 26:786-788 (Aug.), 1936.
15. Pansing, H. H. Study of Our Present Methods to Combat Diphtheria. *Ohio State M. J.*, 32:1194-1197 (Dec.), 1936.
16. Glenny, A. T., and Südmersen, H. J. Notes on Production of Immunity to Diphtheria Toxin. *J. Hyg.*, 20:176 (Oct.), 1921.
17. Park, W. H. Duration of Immunity Against Diphtheria. *J.A.M.A.*, 109:1681-1684 (Nov. 20), 1937.

Similarity of Chronic Infections With *Salmonella* Typhimurium and Tuberculosis in Guinea Pigs

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THE occurrence of *Salmonella* infections among guinea pigs has been recognized for many years. Smith and Stewart¹ first described the condition in the United States and gave it the name "pseudo-tuberculosis." The resemblance between this infection and that produced by tubercle bacilli is quite close as has been repeatedly emphasized. The condition has usually attracted attention, however, because of the increased mortality it produces in guinea pig herds rather than because of the confusion which may arise when such diseased animals are used for diagnostic purposes. In view of the increasing use of guinea pigs for the detection of subclinical and minimal tuberculosis in man, it appears desirable to point out the difficulties which may arise from this source.

"Pseudo-tuberculosis" occurs both as epizootics with, at times, an appalling mortality (Wherry,² Plague Commission,³ Petrie and O'Brien,⁴ Howell and Schultz,⁵ Gheorgi and Barth⁶), and as enzootics (Thomas,⁷ Edington,⁸ Duthie and Mitchell,⁹ Walker and Sweeney¹⁰). The transition of an epizootic into an enzootic has been described by Nelson and Smith¹¹⁻¹⁴ in a series of papers. The outbreak to be discussed by us was apparently an enzootic which was activated into an epizootic of mild degree.

In this laboratory approximately 50 guinea pigs are inoculated each week with material obtained from patients thought to have tuberculosis. These animals are 6-8 weeks old at the time of inoculation, and are supplied to us as they are required. They are placed in a single large pen when received. After injection, they are placed in individual cages in another room where they remain for 6 weeks, when they are killed and autopsied to determine whether they have developed any lesions of tuberculosis. Ordinarily, we expect about 6-8 per cent of the inoculated animals to die of intercurrent infection during the 6 weeks' observation. In the early part of August, 1938, following a severe heat wave, the mortality rose to 19 per cent. At first these deaths were attributed to the heat as no lesions could be found at autopsy. Shortly afterward we began to find an occasional animal which presented all the gross pathological changes seen in guinea pig tuberculosis of the artificial variety, but in which no acid-fast bacilli could be found in the routine smears made from the caseous lesions. Microscopic sections of the spleens showed a histological picture identical with that of tuberculosis. On more thorough bacteriological investigation we were able to demonstrate Gram-negative bacilli.

TECHNIC

Each guinea pig was opened with clean but not sterile instruments. Smears were made from any accumulation of fluid in either the abdominal or thoracic cavities. Cultures of the blood, urine, and bile were made with aseptic precautions into 1 per cent glucose broth. Several fecal pellets, were removed from the lower bowel, macerated in a 30 per cent glycerin-0.5 per cent lithium chloride mixture, and a heavy inoculation smeared over the surface of a Blair-Wilson bismuth sulfite medium plate. The spleen was removed, passed through a flame to sterilize the outer surface, and transferred to a sterile mortar, ground to a pulp, a thick emulsion made with sterile normal saline, and finally inoculated into 1 per cent glucose broth. All cultures were incubated for 48 hours and those showing growth were subcultured on a litmus-lactose agar plate to test the purity of the culture. Colonies from this plate were then inoculated into the various test sugars and agglutinated by a specific serum (strain 1 serum).

BACTERIOLOGY

One hundred and forty-eight animals were studied, 48 of which were found to be infected. Seventy-eight cultures were completely identified; 39 from the spleen, 25 from the feces, 9 from the blood, 3 from the urine, and 2 from the bile. All of these were identical culturally and serologically with the original culture isolated from a caseous abscess in a spleen and referred to in this paper as strain 1. This strain was used to immunize a rabbit to produce an immune serum with a titer of 1-10,000 for the homologous organism.

Cultures of the heart blood were always found to be positive in animals dying from the disease—either acute or chronic. In 4 animals killed, and found at autopsy to be suffering from the disease, blood cultures were nega-

tive. Urine and bile cultures were not made routinely, but the urine was found to be infected in 4 of 8 diseased animals, the bile in 2 out of 6. In 32 infected animals, cultures of both the spleen and feces were made; in 15 both were positive; in 13 the spleen was positive while the feces were negative; in 4 the feces were positive but the spleen negative. Whether these latter animals were passive carriers cannot be proved, but it is certainly suggestive.

Previous workers have shown that the infecting organism is either *Salmonella typhimurium* (Edington,⁸ Petrie and O'Brien,⁴ Nelson¹³), or *Salmonella enteritidis* (Duthie and Mitchell,⁹ Plague Commission,³ Thomas⁷). Much of the earlier work has to be discarded because of the recent advances in classifying members of this group. Wherry² reported an organism which he called *Bacillus pestis caviae*, but which Jordan¹⁵ has classified as *Salmonella enteritidis*. Jordan¹⁵ and Raebiger and Lerche¹⁶ state that *Salmonella typhimurium* is much more common than *Salmonella enteritidis*. Tenbroeck¹⁷ found the reverse to be true.

The organism isolated from our cases was a pleomorphic, Gram-negative bacillus varying from short coccoid forms to large bacillary ones. The smaller forms stained bipolar or barred and were the type usually seen in smears from exudates, especially if the organisms were numerous. The larger solidly staining bacillary forms were occasionally seen in animals and always in culture. No capsule was demonstrated. The organism was actively motile. Growth was profuse on all media. On plain agar the colonies were round, somewhat opaque, white, with a smooth edge. Good growth occurred on the Blair-Wilson medium, the colonies being lusterless and dull gray with considerable blackening of the medium. Lactose and sucrose were not fermented. Acid and gas were formed in glucose, mal-

TABLE I

Agglutination Titers of Various Members of the *Salmonella* Group With Their Respective Sera

	<i>S. Paratyphi-B</i> Serum	Strain I Serum	<i>S. typhimurium</i> Serum	<i>S. cholerae-suis</i> Serum
Strain I	1-6,400	1-10,000	1-2,500	1- 400
<i>S. typhimurium</i>	1-3,200	1- 6,400	1-2,500	—
<i>S. paratyphi-B</i>	1-6,400	1- 6,400	1-1,600	—
<i>S. cholerae-suis</i>	—	1- 400	—	1-12,800
<i>S. enteritidis</i>	—	1- 100	—	—

tose, mannite, sorbitol, rhamnose, dulcitol, xylose, and mannose in 18 hours. After 4-7 days' incubation the dulcitol and sorbitol media became secondarily alkaline using brom thymol blue as an indicator. The methyl red test was positive in 24 hours. Indol was not formed after 4 days' incubation. Litmus milk was acid after 18 hours, becoming strongly alkaline after 3-4 days' incubation.

This bacillus was identified as *Salmonella typhimurium* from the serological tests. The tests were made with known members of the *Salmonella* group in stock and with antisera previously prepared against these stock strains. As most of the antisera were old, the titer was apt to be rather low. This was particularly true of the *Salmonella typhimurium* serum (titer 1-2,500). Tables I and II represent a typical protocol of the serological experiments. All agglutination tests were incubated at 37° C. for 2 hours and left overnight at 5° C. Absorption tests were placed in a 50°C. water bath for 2 hours and then placed in the icebox overnight.

Usually one massive absorption was sufficient to remove all the agglutinins for the absorbing organism. If this did not suffice, a second absorption was done using a smaller quantity of organisms. Two absorptions were the most ever required.

The pathogenicity of this organism for guinea pigs was readily proved. Three strains were used, one isolated from the spleen of an animal with chronic disease, one from the blood stream of an animal dying of the acute disease, and the third from a culture of feces. Subcutaneous and intraperitoneal injection of 10-20 million organisms into 6 animals produced death in 18 hours in 3, 1 died on the 4th day after injection, and 2 on the 5th day. The changes found at autopsy were the same regardless of the site of inoculation. There was considerable injection of the blood vessels over the abdominal musculature and beneath the skin. The peritoneum and pleura were markedly injected. Both the peritoneal and pleural cavities contained 3-10 cc. of thin, slightly yel-

TABLE II

The Results of Reciprocal Agglutinin Absorption Tests

Organism Tested	<i>S. Paratyphi-B</i> Serum Absorbed With Strain I Organisms	<i>S. typhimurium</i> Serum Absorbed With Strain I Organisms	Strain I Serum Absorbed With <i>S. paratyphi-B</i> Organisms	Strain I Serum Absorbed With <i>S. typhimurium</i> Organisms
Strain I	0	0	1-400	0
<i>S. typhimurium</i>	0	0	1-200	0
<i>S. paratyphi-B</i>	1-200	0	0	0

0 = No agglutination of the organisms with the absorbed sera diluted 1-100

lowish, albuminous fluid in which bacilli were easily demonstrated. In the animals which died within 24 hours, the viscera showed no changes, gross or microscopic, beyond an intense, hemorrhagic congestion and many fresh fibrinous adhesions about the spleen, over the dome of the liver, and occasionally between the loops of small intestine. In the 3 guinea pigs which lived for 4-5 days, the liver and spleen were found to have enlarged to about twice the normal size. In one animal dying on the 5th day many tiny white nodules were found throughout the spleen. Microscopically these were tiny areas of endothelial proliferation identical with those found in the naturally infected guinea pigs. The organisms were readily recovered from the blood, spleen, urine, and feces of these experimental animals.

PATHOLOGY

Two types of gross anatomical lesions, with all degrees of gradation between, were seen in the guinea pigs which were naturally infected. Some animals died of an acute hemorrhagic disease with lesions exactly like those found in our inoculated guinea pigs. In about half the spleen showed a slight but definite enlargement. Such animals in the cages would eat well and gain in weight until about 24 hours before death when they would appear listless with ruffled fur. In a few the time between the onset and death was so short that no evidence of illness was seen.

Most of our animals died of the chronic form of the disease. They appeared listless and had ruffled fur for 4-7 days before death, but continued to eat well until they were moribund, and the loss of weight was minimal. Indeed, in those guinea pigs killed routinely at the end of 6 weeks, such animals often appeared fatter and larger than their normal brethren.

At autopsy these animals had no

injection of the superficial blood vessels. The peritoneal and pleural cavities contained no fluid. Old fibrinous adhesions about the spleen and between the upper loops of small bowel and the stomach were common. The mesenteric lymph glands were, as a rule, only a little enlarged. The spleen was always enlarged, at times attaining a size of 4×2 cm. as against an average normal size of $2\frac{1}{2} \times 1\frac{1}{4}$ cm. The spleen always contained yellowish-white, firm nodules, ranging in size from those barely visible up to 2-3 cm. across and varying in number from 1 to 100 or more. At times the spleen contained definite abscesses, 5-10 mm. across, in the pus of which the *Salmonella* organism was easily demonstrated. Nodules similar to those occurring in the spleen were occasionally found in the liver and over the surface of the peritoneum. No gross pathological changes were found in the other organs.

Histologically the most typical lesions are seen in the spleen and consist of endothelial proliferation. This begins in the center of the lymph follicles and gradually increases until the entire follicle has been replaced by large endothelial cells, which form a solid, compact mass which may replace all or most of the normal splenic tissue. In the center of the larger nodules necrosis of the endothelial cells occurs together with the infiltration of many polymorphonuclear leucocytes. In the largest nodules the center is entirely composed of pus cells and cellular debris. The endothelial cells remaining outside of this central necrotic area become elongated and take on the appearance of fibroblasts. These cells form a sort of capsule so that grossly the entire nodule may be separated from the surrounding splenic tissue. The "capsule" always contains a few lymphocytes. Aside from some slight engorgement of the capillaries, there are no other lesions in the spleen.

The nodules in the liver and on the peritoneal surface apparently arise through the same process as those in the spleen. Accumulations of large mononuclear cells, having the appearance of endothelial cells, occur in these areas. These do not seem to arise from lymphoid follicles. In the largest nodules central necrosis and polymorphonuclear leucocytic infiltration occurs. The capillaries of both the liver and kidney are distended. No areas of endothelial cell proliferation were found in any organ other than those mentioned. Lesions in all of the organs have been reported at one time or another by other authors (Edington,⁸ Raebiger and Lerche,¹⁰ Howell and Schultz,⁵ Thomas,⁷ Duthie and Mitchell,⁹ and Nelson and Smith¹¹).

Differentiation between the chronic form of "pseudo-tuberculosis" and true tuberculosis, although usually not difficult, at times may be impossible. Histologically there is no difference between them. The tuberculous nodules produced by inoculation of guinea pigs arise from the proliferation of the endothelial cells with a secondary central necrosis and infiltration by polymorphonuclear leucocytes. Giant cells and typical tubercle formation as seen in human tuberculosis do not occur in the guinea pig. Care should be taken not to confuse the megalokaryocytes occasionally found in normal guinea pig spleens with tuberculous giant cells.

Differentiation is best made from the gross lesions. The characteristic feature of both diseases is the firm, yellowish-white nodules usually found in an enlarged spleen and occasionally distributed through the liver and over the peritoneum. Large caseous abscesses, which are not uncommon in "pseudo-tuberculosis," have never been found in our animals with true tuberculosis. Moreover, fibrinous abdominal adhesions appear to be more common in animals infected with *Salmonella typhi-*

murium than in those with tubercle bacilli. In tuberculosis the mesenteric lymph glands are large, caseous, and there is considerable matting together and thickening of the omentum. In "pseudo-tuberculosis" the glands are discreet and only slightly enlarged. However, considerable glandular enlargements may, in rare instances, be observed in "pseudo-tuberculosis" while the reverse picture of small discreet lymph glands and splenic nodules is not infrequently observed in our tuberculous pigs. Differentiation of the two conditions must depend on demonstrating the causative organism in the lesions. Routine smears from suitable caseous areas should be made in every instance, and no diagnosis of tuberculosis should be made unless acid-fast bacilli are found in such smears.

EPIDEMIOLOGY

Although shedding of the organisms through the intestinal tract was early recognized, attempts to infect guinea pigs by feeding have been unsuccessful or have succeeded only by the use of enormous numbers of organisms. Such experimental animals may show the organism in their feces but fail to develop any clinical disease (Smith and Nelson,¹² Petrie and O'Brien,⁴ Friedlander and Hertert¹⁸). Nelson¹⁴ has shown that healthy animals, placed in contact with sick ones under natural conditions, will become infected. However, Petrie and O'Brien⁴ and Duthie and Mitchell⁹ were unable to infect animals by this method.

As none of our guinea pigs ever showed lesions in the lungs, it would seem as though the infection were transmitted by way of the alimentary canal. Bacteria were found to be discharged from the sick animals in our herd through the feces and urine, so that it seemed certain that the large receiving pen and the food and water receptacles in it were thoroughly contaminated. In

order to demonstrate the communicable nature of this disease under natural conditions, 12 guinea pigs from a different source were obtained and their feces examined. None showed any organisms of the *Salmonella* group. Autopsies on about 50 animals from the same source showed that the stock was free from *Salmonella* infection. These 12 animals were placed in the main pen with 42 guinea pigs of the old infected stock. The animals remained together in the one pen from 9-3-38 until 10-24-38 when all survivors were killed. During this time 7 guinea pigs of the old stock died, and 6 of these were found to be infected with *Salmonella typhimurium*. Two of the 12 experimental animals died of this infection, one on 9-24-38 after an illness of 36 hours, the other on 9-29-38 after an illness of 6 days. One experimental animal was found to have the

chronic type of *Salmonella* disease at autopsy on 10-24-38. One other experimental animal (Exp. 10) was found to have the organisms in the feces although cultures of the spleen were negative and there was no gross evidence of infection.

During this experiment, fecal cultures were made from all of the new stock guinea pigs and from about half of the old ones. Table III contains a summary of the results in those cases in which a positive culture was obtained from the feces. It would appear that transitory infection of the animals does occur, probably indicating the occurrence of a carrier state, i.e., the harboring of virulent organisms by an animal not showing any clinical evidence of infection. Of course, the mere presence of bacteria in the feces does not mean that there is actual invasion of the body

TABLE III
Summary of the Positive Results Obtained in the Cross-Infection Experiment

G. P.	9/3	9/8	9/16	9/25	10/3	10/10	10/18	10/24		Autopsy Findings
	Feces	Feces	Feces	Feces	Feces	Feces	Feces	Spl.	Feces	
Exp. 1	—			—	—	—	—	+	—	Nodular spleen
Exp. 5	—			+	—	—	—	—	—	Splenic adhesions
Exp. 7	—			+	—	—	—	—	—	No lesions
Died 9/29										
Exp. 9	—			+	+					Nodular spleen and liver
Exp. 10	—			—	—	—	—	—	+	No lesions
Died 9/24										
Exp. 12	—			+						Nodular spleen
CP 1		+	—	—		—		—	—	No lesions
CP 2		+	—	—		—		—	—	No lesions
CP 10		—	—	—		—	+	+	+	Splenic adhesions
CP 12		—	+			—		—	—	No lesions
Died 9/20										
CP 13		—	—	+						Septicemia
CP 15			—	+		—		—	—	No lesions

Exp. = Guinea pigs from the new, uninfected stock
CP = Guinea pigs from the original, infected herd

tissues. Reference has already been made to an instance (Exp. 10) where the bacteria were apparently living in the intestinal tract without harming the host. Table III shows also that ingestion of the organisms does not usually lead to clinical infection, as only 3 out of 9 of the animals from whose feces *Salmonella typhimurium* was recovered succumbed to the infection. It would seem that the animals either recover fairly promptly or succumb, as we found no instance of prolonged shedding of the bacteria unless the animal was clinically ill.

Raebiger¹⁰ states that agglutinins are formed during the course of the disease and may be used for determining the presence or absence of infection in a herd. From 47 of our animals blood was taken for agglutination tests. Of 4 animals dying of the chronic disease, 2 had no agglutinins while the other 2 had a titer of only 1-10. One animal killed after an illness of almost 2 weeks had a titer of 1-100. Of 4 animals which appeared to be healthy, but were found to be infected at autopsy by culture, 3 had no agglutinins and the 4th a titer of 1-400. The last presented no anatomical lesions although the culture of the spleen showed that *Salmonella typhimurium* was present. Five animals were killed from which no positive cultures were obtained at autopsy; 3 of these had no agglutinins, 1 a titer of 1-400 but no anatomical evidence of past infection, 1 a titer of 1-10 with many fibrinous adhesions about the spleen. Conclusions cannot be drawn from the remaining animals because of insufficient data. The highest titer found was 1-800 in a pregnant female, never known to have been infected and which had no anatomical evidence of past infection at autopsy. Her history before reaching our pens is unknown. From the data gathered it would appear safe to conclude only that an animal

may develop agglutinins against the infecting organism, but the absence of such agglutinins does not mitigate against the presence of "pseudo-tuberculosis," either present or past, in the herd.

The original source for this infection is not known although the dealer's own breeding stock was found to be infected. He stated that the guinea pigs on his farm never showed any signs of illness. Those animals examined by us appeared healthy while alive although definite pathological and bacteriological evidence of infection was obtained from them at post-mortem examination. It seems likely that this was a latent infection which was stirred up by the change in diet and the inoculation given the guinea pigs in this laboratory. Such factors are difficult to evaluate, and no control experiment was carried out by us to determine the truth of this hypothesis. Other writers on this subject have found such factors to exist. Edington⁸ found that low vitamin diets, severe temperature changes, or mechanical injury to the gastrointestinal tract rendered animals more susceptible to infection. Nelson¹⁴ noted that pregnant sows were most apt to be infected, an observation which was not found to be true among our animals. Okamoto²⁰ found that the parenteral injection of organ extracts was enough to activate a latent infection already present in the guinea pig.

Our efforts in combating this epizootic were directed toward the prevention of spread of the disease rather than to the cure of the individual animals. All the small cages were cleaned with hot water and sterilized after each lot of animals was killed. The large receiving pens were likewise thoroughly cleaned with hot water and lysol before any new guinea pigs were admitted to the colony. Scattered reports in the literature indicate that fresh vegetables, when fed to the animals in large

amounts, will aid in combating the disease; in our hands the results obtained were unsatisfactory. Vaccines and immune sera were not tried although Howell and Schultz,⁵ Nichols and Stimmel,²¹ and Rake²² have reported some success with the use of the former. By the use of simple cleansing methods, our colony has been free of infection for the past 6 months.

SUMMARY

1. An outbreak of "pseudo-tuberculosis" among guinea pigs is reported.
2. Chronic *Salmonella* infection of guinea pigs due to *Salmonella typhimurium* cannot be differentiated from tuberculosis by gross anatomical or histological methods. The demonstration of tubercle bacilli in routine smears made from the caseous lesions in the guinea pig is the only reliable way to tell the two conditions apart.
3. The infection is probably spread by means of infected feces and urine. A true carrier state, temporary at least, may develop in individual animals.
4. The organisms are most often found in the spleen. Inability to demonstrate the organisms in fecal cultures does not mean that the animal is not infected.
5. Agglutinins may or may not be formed during the course of the disease. When present they are indicative of successfully combated previous infection rather than of present infection.
6. The presence of a *Salmonella* infection is not incompatible with an appearance of exceedingly good health on the part of the animal.

REFERENCES

1. Smith, T., and Stewart, J. Spontaneous Pseudo-Tuberculosis in a Guinea Pig and the Bacillus Causing It. *J. Boston Soc. Med. Sci.*, 1, 12, 1897.
2. Wherry, W. The Use of Bacillus Pestis-Caviae as a Rat Virus. *J. Infect. Dis.*, 5:519, 1908.
3. Plague Commission Report No. 32. *J. Hyg.*, 8:302, 1908.
4. Petrie, G., and O'Brien, R. A Guinea Pig Epizootic. Guinea Pigs as Chronic Carriers of an Organism Belonging to the Food-Poisoning Group. *J. Hyg.*, 10:231, 1910, and *J. Hyg.*, 10:287, 1910.
5. Howell, K., and Schultz, O. An Epizootic Among Guinea-Pigs Due to a Paratyphoid B Bacillus. *J. Infect. Dis.*, 30:516, 1922.
6. Gheorghi, J., and Barth, C. An Epizootic in Guinea Pigs Due to an Organism of the Salmonella Group. *Comp. rend Soc. de biol.*, 96:1182, 1927.
7. Thomas, B. Occurrence of Organisms of the Enteritidis Paratyphoid B Group in Guinea Pigs. *J. Infect. Dis.*, 35:407, 1924.
8. Edington, J. R. Endemic Infection of Guinea Pigs with *B. Aertrycke*. *J. Comp. Path. & Therap.*, 42:258, 1929.
9. Duthie, R., and Mitchell, C. Salmonella Enteritidis Infection in Guinea Pigs and Rabbits. *J. Am. Vet. M. A.*, 78, 27, 1931.
10. Walker, E., and Sweeney, M. Some Infections Simulating Experimental Typhus in the Guinea Pig. *Am. J. Trop. Med.*, 12:217, 1932.
11. Nelson, J., and Smith, T. Studies on a Paratyphoid Infection in Guinea Pigs. *J. Exper. Med.*, 45:353, 1927.
12. Smith, T., and Nelson, J. Studies on a Paratyphoid Infection in Guinea Pigs. *J. Exper. Med.*, 45:365, 1927.
13. Nelson, J. B. Studies of a Paratyphoid Infection in Guinea Pigs. *J. Exper. Med.*, 46:541, 1927.
14. Nelson, J. Studies on a Paratyphoid Infection in Guinea Pigs. *J. Exper. Med.*, 47:207, 1928.
15. Jordan, E. Differentiation of the Paratyphoid Enteritidis Group. *J. Infect. Dis.*, 36:309, 1925.
16. Raebiger, H., and Lerche, M. Etiology and Pathological Anatomy of the Principal Spontaneous Infections of Guinea Pigs. *Ergebn. d. allg. Path. u. path. Anat.*, 21, abt. 2:690, 1926.
17. Tenbroeck, C. A Group of Paratyphoid Bacilli from Animals Closely Resembling Those Found in Man. *J. Exper. Med.*, 33:19, 1920.
18. Friedlander, R., and Hertert, L. Virulence of *B. Paratyphosus* B (*Aertrycke*) in Guinea Pigs. *J. Infect. Dis.*, 44:481, 1929.
19. Raebiger, H. *Das Meerschweinchen*, 1923, p. 100.
20. Okamoto, T. Epidemiological Observations on Mice and Guinea Pigs. *Klin. Wchnschr.*, 5:795, 1926.
21. Nichols, H., and Stimmel, C. Protection Against Typhoid-like Infections by Vaccination. *J. Exper. Med.*, 38:283, 1923.
22. Rake, G. Active Immunity Against an Intestinal and a Respiratory Infection. *Am. J. Hyg.*, 28:377, 1938.

Zoölogical Problems Relative to Meat Inspection and Their Bearing on Public Health

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OF THE hundreds of species of protozoa, helminths, and arthropods that parasitize animals that are used for human food, comparatively few are of importance in meat inspection. From the viewpoint of livestock production all parasites must be regarded as injurious or potentially injurious. From a meat inspection standpoint, however, the only parasites that are regarded as important are (1) those which occur in the edible portions of carcasses and are directly transmissible to man; (2) those which occur in the edible portions of carcasses and are indirectly transmissible to man through other hosts; and (3) those which, by their mere presence, or because of the pathological conditions which they produce in the edible portions of carcasses, render the affected parts objectionable as human food. Naturally, the parasites that are directly transmissible to man are of greatest importance, and the meat inspection regulations of various countries contain provisions for eliminating this danger to human health.

PARASITES DIRECTLY TRANSMISSIBLE TO MAN

Fortunately, the only species of parasites occurring in the flesh of food animals that are directly transmissible

to man are the bladder worms of the beef and pork tapeworms, respectively, and the larvae of trichina. While tapeworms may be more or less deleterious to human health and may even affect seriously delicate and nervous persons, the pathogenicity of trichinae has been established beyond question, the latter parasites being capable of producing serious illness and even death in human beings. The prevention of human infestation with the three species of parasites mentioned cannot be wholly effected through meat inspection alone; meat inspection can and does assist materially in controlling infestations of human beings with these worms. A system of meat inspection which supervises the slaughter of all food animals, coupled with care in the preparation of meat for the table, should eventually control and even eradicate these three parasites that are directly transmissible from food animals to human beings.

RECENT INVESTIGATIONS ON CYSTICERCI IN BEEF AND THEIR BEARING ON MEAT INSPECTION

During the last few years scientific investigations regarding the vitality of cysticerci of *Taenia saginata* have led to an important modification in meat inspection procedure with regard to this

parasite. Up to 1931 it was generally assumed that the vitality of cysticerci in beef was completely destroyed following the retention in the cooler of infested carcasses for a period of 21 days. This assumption was based on tests first carried out by Perroncito⁴ in Italy, and later extended greatly by Ostertag³ in Germany. Perroncito determined that all cysticerci in an infested calf carcass were dead 14 days after the animal had been slaughtered; Ostertag showed, however, that the natural death of cysticerci in beef did not occur uniformly in a 2 week period, but that in 3 weeks following the death of the infested host animal all the cysticerci were dead. Ostertag's observations were based on various tests applied to determine the vitality of the cysticerci following the retention of the infested carcass for 3 weeks, these tests being supplemented by human feeding experiments in which Ostertag himself and a number of assistants and students of the Berlin Veterinary College participated. These tests involved the swallowing by the human volunteers of cysticerci obtained from beef carcasses which had been retained for 21 days, with negative results so far as the development of tapeworms in the human intestine was concerned. On the basis of this searching investigation, the retention for 21 days of beef carcasses infested with cysticerci was incorporated in the meat inspection regulations of Germany and was later incorporated in the regulations governing the meat inspection of the U. S. Department of Agriculture.

In 1931 Schmey and Bugge in Germany published^{8, 9, 10} the results of investigations which cast considerable doubt on the effectiveness of a 21 day retention period in completely destroying the vitality of *Cysticercus bovis*. These investigators determined that not all of the cysticerci present in beef were destroyed in 21 days; some of the

cysticerci present in lightly infested beef carcasses still showed some sign of life even after 41 days' retention, viability being determined by certain biological tests involving the demonstration of the ability of the cysticerci to evaginate the heads and the demonstration of ciliary movement in the flame cells of these worms. Schmey and Bugge determined, moreover, the important fact that cysticerci removed from carcasses that had been retained by them in the cooler for 28 days were still capable of developing into strobilate tapeworms in the intestine of man. Of the 6 volunteers who swallowed a total of 105 cysticerci from beef that had been retained 28 days, 3 became infested and 6 mature strobilate tapeworms were removed from these subjects following anthelmintic medication.

The work of these investigators having been confirmed by Clarenburg¹ in Holland, so far as the viability of cysticerci was concerned following the retention of infested carcasses up to 41 days, investigations were undertaken in the Zoölogical Division of the Bureau of Animal Industry to test the soundness of these new observations. In 1933, 3 infested beef carcasses were retained in the cooler of a meat packing establishment in Chicago for 21 days or longer; at the end of 21 days it was determined that most of the cysticerci showed movement and that from 60 to 100 per cent of various lots of these worms were capable of extruding their heads in suitable media, this being sound evidence of viability. Nearly similar results were obtained when infested carcasses were retained in the cooler for 25 and 26 days, respectively, but after retention for periods ranging from 31 to 48 days there was no evidence of life in the cysticerci. One worker in the Zoölogical Division swallowed several cysticerci from beef that had been retained in the cooler for 26 days; although these cysticerci were

still showing signs of life, he failed to show evidence of infestation with tapeworms.

Although the evidence obtained in our investigations was at variance with those published abroad, the results obtained did show that the 21 day retention period, previously accepted by parasitologists and meat inspection experts as adequate for the destruction of the vitality of beef cysticerci, did not destroy life in those parasites in all cases.

The discrepancy in the results obtained by Ostertag many years ago and those obtained more recently in Germany have been ascribed to the improvement in refrigeration in recent years, the assumption being that the superior cooler refrigeration facilities at the present time favor the survival of cysticerci rather than hasten their devitalization. According to this assumption, the imperfect cooler refrigeration of previous years was responsible for the comparatively early death of cysticerci by hastening certain changes in the meat that produced deleterious effects on the parasites. It is quite possible that the differences between our results and those in Europe might be accounted for, at least in part, on the basis of differences in conditions prevailing in the meat coolers used in this country and those used abroad. Regardless of the true explanation, however, our work demonstrated conclusively that it was no longer proper to include in the regulations the 21 day retention period as an effective method for the destruction of the vitality of *Cysticercus bovis*, and this requirement was accordingly eliminated from the regulations. The alternative requirement, involving the refrigeration of infested carcasses for not less than 6 days at a temperature not higher than 15° F., based on investigations by the late Dr. B. H. Ransom⁶ has been retained in our regula-

tions because the more recent investigations in Europe on the effects of low temperatures on the vitality of cysticerci have shown that the retention period required under federal meat inspection is more than adequate to destroy life effectively in these parasites. According to the later European work by Schmey and Bugge,⁸ *Cysticercus bovis* loses its vitality when infested carcasses are retained for 4 days at a temperature of 14° to 17.6° F. (—10° to —8° C.) the effective period being 2 days less than that required under our regulations. Viljoen¹² has concluded also that no cysticerci will remain viable after 6 days' continuous freezing.

INVESTIGATIONS ON TRICHINAE

During the last 10 years human trichinosis has been assuming increasing importance as a public health problem; the number of cases reported in the medical literature and elsewhere during this time has shown a sharp increase. From 1842, when trichinosis in man was first diagnosed in this country, up to 1915, when all the known cases were summarized by Ransom,⁷ the total number of recorded cases of human trichinosis in this country was approximately 1,500. From 1915 to about 1925 the number recorded annually in this country was comparatively low. Since 1925 there has been a marked increase, the total number in 1937 being between 5,000 and 6,000. In other words, the number of cases during these 22 years is from 3 to 4 times that recorded for the previous 73 years.

While it cannot be determined on the basis of available evidence whether the increase in the cases of human trichinosis in this country is only apparent or real, in the opinion of the writer this increase is largely apparent because of the increased interest in this disease by the medical profession, and their increasing vigilance in establishing

a correct diagnosis. The increased interest by the medical profession is due almost entirely to certain statistical information on the prevalence of trichinae in human diaphragms examined by various investigators by the digestion or other improved technic.

Following Queen's report⁵ which showed that trichinae were found by him in about 17 per cent of 500 diaphragms obtained from consecutive human necropsies in Rochester, N. Y., and in about 27 per cent of 200 diaphragms from Boston, a number of workers who have followed up this type of investigation have brought to light facts which show conclusively that the incidence of infestation of man with trichinae in the United States is much greater than had ever been suspected. In a recent summary covering 1,000 diaphragms examined at the National Institute of Health, Washington, D. C., Nolan and Bozicevich,² the incidence was found to be 17 per cent.

It is important to bear in mind that the surprisingly high incidence of trichina infestation in human beings in the United States, as determined by the examination of diaphragms by the digestion technic or by sectioning, or by repeated examination of press preparations, is of significance, despite the fact that very few of the individuals in whose diaphragms trichinae were found post-mortem were known to have suffered from trichinosis during life. The findings indicate conclusively that many persons intentionally or unwittingly eat pork that is raw or nearly raw, and as a result acquire an infestation with trichinae. This in turn indicates that sources of trichina infestation are present in the United States and that the extent of this infestation is sufficient to affect in some localities up to 25 per cent or more of the population, assuming that the sampling of human diaphragms, as recorded, was adequate from a statistical viewpoint.

INCIDENCE OF TRICHINAE IN SWINE

In order to ascertain the prevalence of trichinae in swine, and to determine the main sources of this infestation, so far as human beings are concerned, the Zoölogical Division in coöperation with the Meat Inspection Division of the Bureau of Animal Industry inaugurated in 1933 an extensive survey, the object being to determine by random sampling the incidence of trichinae in garbage-fed hogs and in grain-fed hogs in various parts of the United States, to check the effectiveness of the Bureau's prescribed methods for destroying the vitality of trichinae in meat food products containing pork muscle tissue that are customarily eaten without cooking, and incidentally to ascertain the prevalence of trichinae in prepared meat food products of kinds that are not processed for the destruction of life in trichinae under the requirement of the U. S. Bureau of Animal Industry. The latter served as a check on the technic used in our investigations for the processed products. The technic used involved the artificial digestion in an incubator of approximately $\frac{1}{2}$ lb. samples; this was also followed for samples of fresh pork.

The results in grain-fed and in garbage-fed hogs to June 30, 1937, have been summarized by the writer,¹¹ as follows:

Out of 6,622 * samples of diaphragm muscle tissue obtained from as many grain-fed hogs originating in the South, the Middle West, the North-Central States and in some of the Eastern States, only 60, or 0.91 per cent, were found to be infested with trichinae; out of 6,484 * diaphragm samples from as many garbage-fed hogs, 286, or 4.41 per cent, were found to be infested. These data show an incidence of trichinae in garbage-fed hogs about 5 times as great as in grain-fed hogs.

* The figure given in the previous publication is incorrect due to a typographical error.

Since July 1, 1937, additional data have been collected, with results that are even more striking. Out of 2,901 diaphragms collected in federally inspected establishments in Chicago and Kansas City from grain-fed hogs originating in the Middle West, 34, or 1.17 per cent, contained trichinae; the number of trichinae in individual diaphragms ranged from 1 to 1,113. However, of the positive diaphragms 76.4 per cent contained less than 5 larvae, this type of infestation being practically negligible. Out of 2,847 samples of diaphragms obtained from as many garbage-fed hogs in an important garbage-feeding center on the Atlantic seaboard, 286, or 10.04 per cent, contained trichinae; the number of trichinae in individual diaphragms ranged from 1 to 69,700. Of the positive diaphragms only 19.3 per cent contained less than 5 larvae.

These data demonstrate conclusively that pork from garbage-fed hogs is the main source of trichinosis for man, if such pork is eaten raw or after only partial cooking or inadequate curing. The available data are sufficiently extensive to warrant the preliminary conclusion that about 1 per cent of the grain-fed hogs in this country harbor trichinae, whereas from 4.5 to 10 per cent of garbage-fed hogs are infested, the degree of infestation being much greater than in hogs not fed on garbage.

INCIDENCE OF TRICHINAE IN MEAT FOOD PRODUCTS CONTAINING PORK MUSCLE TISSUE

During the last 5 years there have been examined in the laboratories of the Zoölogical Division 10,754 individual $\frac{1}{2}$ lb. samples of various meat food products containing pork muscle tissue. The samples were obtained through federal inspectors in charge of meat inspection, who submitted, in connection with each sample, data as to the method of processing and informa-

tion as to whether the product was of a kind customarily eaten without cooking in the home. Each sample, properly identified as to class and place of origin, was ground and digested in a fluid containing pepsin and hydrochloric acid in an incubator for about 24 hours. Live or dead trichinae, if present, could be recovered from the sediment of the digestive fluid.

Of the samples so examined, 9,788 were from products processed under Bureau requirements to insure the destruction of life in trichinae, and 966 were from products not so processed.

The samples of products processed for the destruction of life in trichinae—such as bologna, frankfurters and Vienna sausage, various kinds of dry or summer sausage, cooked ham and Italian-style ham—were obtained from federally inspected establishments and represented a good cross-section of these products that are released to the consuming public. The processing included heating and special refrigeration, as well as the various prescribed curing methods. The results obtained were as follows:

Out of the 9,788 specially processed samples, trichinae were found in only 75; 71 contained only dead, uncoiled trichinae and 3 contained trichinae showing feeble movements. Feeble trichinae were found in 3 samples of smoked sausage, the number in the 3 samples being 1, 1, and 3, respectively; a single coiled but dead trichina was found in a skinless frankfurter. It is important to note that the feeble worms referred to were not tightly coiled and deep brown in color as are decapsuled trichinae whose vitality has not been reduced by heat, cold, or other processing. They were loosely coiled and rather pale, but slight movements could be induced by the application of a heated glass rod to the bottom of the glass dish in which they were. Large num-

bers of worms similar in appearance and activity to those just described have been fed to rats in our laboratory at various times in order to determine whether they are capable of surviving and growing in the intestine and producing a new generation of worms. In no instance have such worms succeeded in remaining alive in the intestine of susceptible rats, as determined by the results of a searching examination of the intestines of these experimental hosts 24 hours later. A number of rats to which such worms were fed by stomach tube, or which swallowed relatively large quantities of meat containing such worms, were killed after one month. Following the removal of skin and viscera, the entire carcass of each rat was digested without yielding any trichinae.

Of the 966 products not processed under the requirements as to the destruction of the vitality of trichinae, 480 (nearly 50 per cent) contained these parasites; of the 480 positives, 435 contained only dead trichinae, and the remaining 45 contained live and dead trichinae, the number of live worms per sample ranging from 1 to 14.

ECHINOCOCCUS CYSTS

Of the parasites occurring in the edible parts of food animals that are transmissible to man indirectly, that is, through an intermediate host, hydatid cysts, *Echinococcus*, are the most important. The cystic stage of this parasite develops into strobilate tapeworms in the intestines of dogs, cats, and certain wild carnivores, the feces of the infested carnivores constituting a source of infection for human beings and all classes of domestic animals. An infestation with hydatids in man is a serious condition, and treatment involves a major surgical operation for the removal of the cysts. As the cysts usually lodge in the liver and may occur in other vital organs, particularly the

lungs, it is evident that their removal by surgery involves a serious risk to life.

The occurrence and suspected occurrence of *Echinococcus* infestation in man in this country may be inferred from the repeated requests which come to the Bureau of Animal Industry for an antigen that is used in the complement-fixation test for the diagnosis of this parasitic infestation in man. Through an arrangement with the U. S. Naval Medical School, swine livers infested with *Echinococcus* are forwarded to that school from time to time for the preparation of the antigen and its distribution to physicians and hospitals. During the last 3 or 4 years it has been rather difficult to obtain infested livers from federal inspectors. The station at Richmond, Va., for years a reliable source of supply, is now having some difficulty in obtaining the material needed.

It is probable that meat inspection is largely responsible for what appears to be a sharp decrease in the incidence of *Echinococcus* infestation in swine and other animals. The condemnation of affected organs and cysts and their consignment to the tank cuts down the source from which dogs, cats, and wild carnivores acquire the hydatid tapeworm, thereby destroying the vicious cycle of a parasite that is dangerous to human and animal health.

SUMMARY

An effective system of meat inspection promotes public health (1) through the condemnation of parts of or entire carcasses of food animals containing parasites that are transmissible to man directly and indirectly; (2) through special processing for the destruction of trichinae, and of cysticerci not discoverable by macroscopic examination; and (3) through the condemnation of parts of carcasses or of entire carcasses in which parasitic infestations not trans-

missible to man, but objectionable from esthetic and other standpoints, are so generalized that the parasites and lesions cannot be removed by trimming.

Meat inspection is also an effective control measure for certain parasites, notably tapeworms, that occur as immature forms in edible portions of carcasses; through the condemnation of parts of carcasses so affected, the vicious cycle of these parasites is interrupted. Meat inspection must be regarded, therefore, as one of the important prophylactic measures for the control of parasites affecting livestock as well as human beings.

Certain parasitic infestations transmissible from food animals to human beings cannot be controlled by meat inspection alone; however, a sound inspection system can and does contribute materially to control of certain parasitic infestations of man; in the absence of inspection these parasites would probably constitute a serious human health problem.

REFERENCES

1. Clarenburg, A. Onderzoekingen over de levensvatbaarheid van *Cysticercus inermis*. *Tijdschr. Diergeneesk.*, 59:1-18, 1932.
2. Nolan, M. B., and Bozicevich, J. Studies on Trichinosis. V. The Incidence of Trichinosis as Indicated by the Post-mortem Examinations of 1,000 Diaphragms. *Pub. Health Rep.*, 53:652-673, 1938.
3. v. Ostertag, R. *Handbook of Meat Inspection*. Authorized transl. by Earley Vernon Wilcox, with an introduction by John R. Mohler. 4 ed. 884 pp., illus. London, 1913.
4. Perroncito, E. Esperimenti sulle produzioni del *Cysticercus* della *Taenia mediocanellata* nelle carni dei vitelli; altre prove fatte sulla sua tenacità di vita e sul rapido sviluppo della corrispondente *Taenia mediocanellata* nell'uomo. *Medico Vet.*, Torino. 4 s., v. 6:538-553, 1877.
5. Queen, F. B. The Prevalence of Human Infection With *Trichinella spiralis*. *J. Parasitol.*, 18:128, 1931.
6. Ransom, B. H. The Destruction of the Vitality of *Cysticercus bovis* by Freezing. *J. Parasitol.*, 1:5-9, 1914.
7. ———. Trichinosis. *Rep. 18. Ann. Meet. U.S. Live Stock San. Assn.*, 147-165, 1915.
8. Schmey, M., and Bugge, G. Die Entwicklungsfähigkeit der Rinderfinnen. *Berl. tierärztl. Wchschr.*, 47:501-508, 1931.
9. ———. Ueber Selbstinfektionsversuche mit Rinderfinnen. *Tierärztl. Rundschau.*, 37:719-722, 1931.
10. ———. Zur Lebensfähigkeit der Finnen. *Berl. tierärztl. Wchschr.*, 47:193-199, 1931.
11. Schwartz, B. Trichinosis in Swine and Its Relationship to Public Health. *J. Am. Vet. M. A.*, 92, n.s. 45:317-337, 1938.
12. Viljoen, N. F. Cysticercosis in Swine and Bovines. With Special Reference to South African Conditions [Thesis, Univ. South Africa]. *Onderstepoort J. Vet. Sc. & Animal Indust.*, 9:337-570, 1937.

Meningococcus Meningitis in the District of Columbia

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IN general the occurrence of meningococcus meningitis in the District of Columbia has been similar to that in other urban communities of the United States.^{1, 2, 3} Since 1910 there have been two sharp outbreaks of the disease. The epidemic in 1918 was preceded by a moderate increase in prevalence in 1917. The 1935 outbreak was more explosive in type and during the following 2 years the incidence was above the normal expectancy (see Figure I). In 1931 the incidence of the disease was above the average but not severe enough to classify as an epidemic. In the intervals between these outbreaks

the incidence has been at a fairly low endemic level.

Seasonal occurrence—As in other parts of this country, the disease has been reported most frequently in the late winter and spring months, and least frequently in the fall. The epidemic in 1935 had its peak in March. This epidemic was characterized by a rapid increase in cases from January to the latter part of March when the peak was reached (see Figure II). Most of the cases reported early in the epidemic came from well defined areas in the city where housing and sanitary conditions have been far from desirable.

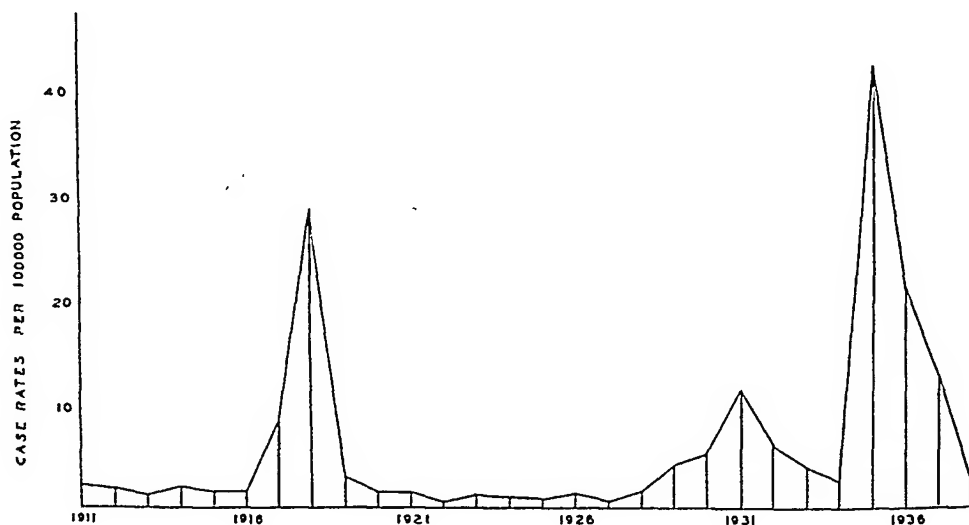
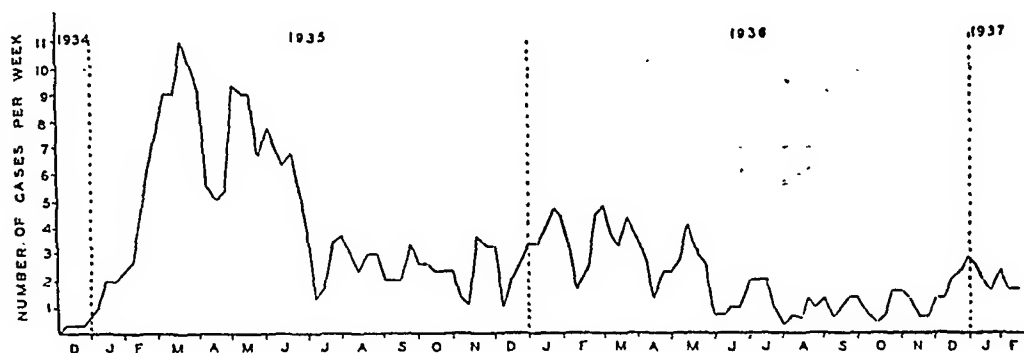


FIGURE I—Incidence of Meningococcus Meningitis in the District of Columbia, 1911-1938

FIGURE II—Number of Cases of Meningococcus Meningitis Reported in the District of Columbia by Weeks from December, 1934, to February, 1937, inclusive



The secondary rise in the number of cases in May of 1935 was due to a large number of cases among colored persons reported from all sections of the city. The decline in the number of cases reported by weeks was much more gradual than the increase at the beginning of the outbreak. Throughout 1935 the number of cases reported each week continued at a fairly high level. The seasonal increase in cases in the winter and spring of 1936 was a gradual one and to a point far below the peak of the previous year. Throughout 1936 the number of cases continued to decrease. The seasonal increase in cases in 1937 was still lower than in 1936, and in 1938 the disease once more assumed a low endemic level.

Racial distribution—As shown in Table I, case rates and death rates from

meningococcus meningitis in the District of Columbia have been higher in the colored population than in the white, with few exceptions. The ratio of colored to white rates has usually been about 2 or 3 to 1. In some years the incidence of the disease has been about equal in the two racial groups, but in years of epidemic or increased prevalence the colored rates have been 2 or 3 times higher than the white.

Sex differences in incidence and mortality—The incidence of the disease in males has invariably been higher than in females. The ratio of male to female cases has been about 2 to 1 in both white and colored persons. Under 20 years of age the male to female ratio was about 1.5 to 1, and from 20 to 40 years varied from 3.1 to 6.1.

TABLE I

Number of Cases and Deaths, Rates per 100,000 Population, and Case Fatality per 100 Cases, from Meningococcus Meningitis, 1928-1937

Year	Cases		Deaths		Case Rate		Death Rate		Case Fatality Rate	
	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored
1928	5	2	3	1	1.4	1.7	0.9	0.8	60.0	50.0
1929	6	10	2	8	1.7	7.6	0.6	6.1	33.3	80.0
1930	12	8	5	3	3.4	6.0	1.4	2.2	41.6	37.5
1931	26	25	11	15	7.1	18.1	3.0	10.8	42.2	60.0
1932	16	19	9	2	4.2	13.2	2.3	1.4	56.1	10.5
1933	12	12	7	1	3.0	8.0	1.8	0.7	58.5	8.3
1934	7	2	0	2	1.7	1.3	0	1.3	0	100.0
1935	93	136	39	47	22.0	85.6	9.1	29.3	42.0	34.6
1936	52	57	24	35	11.8	34.4	5.4	19.9	46.1	61.4
1937	30	60	15	12	6.6	15.2	3.3	7.0	50.0	46.0

TABLE II

Number of Cases and Deaths, Ratio of Male to Female Cases, and Case Fatality Rates, from Meningococcus Meningitis, by Age Groups, 1935-1936

	Number of Cases						Number of Deaths					
	White			Colored			White			Colored		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Under 1 year	1	2	3	6	4	10	0	1	1	3	4	7
1 to 4	13	7	20	26	19	44	3	1	4	4	6	10
5 to 9	5	3	8	15	14	29	1	1	2	8	2	10
10 to 19	18	13	31	37	11	48	11	3	14	11	6	13
20 to 29	28	7	35	22	7	29	9	2	11	10	4	14
30 to 39	19	3	22	13	5	18	11	2	13	10	3	13
40 to 49	12	3	15	2	4	6	8	2	10	2	4	6
50 and over	5	5	10	4	4	8	3	5	8	3	2	5
Unknown	1	0	1	0	0	0	0	0	0	0	0	0
All ages	102	43	145	125	68	193	46	17	63	51	31	82

	Case Fatality Rates				Ratio Male to Female Cases	
	White		Colored		White	Colored
	Male	Female	Male	Female		
Under 1 year	0	50.0	50.0	100.0	0.5	1.5
1 to 4	23.1	14.3	15.4	33.3	1.9	1.4
5 to 9	20.0	33.3	53.3	14.3	1.7	1.1
10 to 19	61.1	23.1	30.0	55.5	1.4	3.3
20 to 29	32.1	28.5	45.4	55.5	4.0	3.1
30 to 39	57.9	66.6	77.0	60.0	6.3	2.6
40 to 49	66.6	66.6	100.0	100.0	4.0	0.5
50 and over	60.0	100.0	75.0	50.0	1.0	1.0
All ages	45.1	39.5	40.8	45.6	2.4	1.9

Case fatality rates—It can be seen in Table I that case fatality rates have varied from year to year, with less variation for white than colored cases. The average for the 10 year period from 1928 to 1937 was 44 per cent for both white and colored groups. Although the incidence of the disease has been higher among males, the fatality rates have been approximately the same for males and females. For the cases reported in 1935 and 1936 the case fatality for white males was 45.1 per cent, 39.5 for white females, 40.8 for colored males, and 45.6 per cent for colored females.

Age distribution of cases and deaths—The distribution of cases showed

wide variations in the different age groups, the greater proportion of cases being in the younger groups. Forty-two per cent of white cases and 68 per cent of the colored occurred in persons under 20 years of age. The case rates per 100,000 population for the various age groups likewise reflect the greater prevalence in the younger age groups.

There was very little difference in the death rates from meningococcus meningitis by age groups in the white population, but in the colored the rates were much higher in children under 5 years of age. In the latter there was a decline in mortality as age increased.

Case fatality rates were fairly low in the younger age groups and increased

with age. Case fatality was higher in infants under 1 year of age than in the 1 to 4, and 5 to 9 year groups, but appreciably lower than in the older ages, *i.e.*, 40 years and over. The fatality rates for males and females were essentially the same when all ages or specific age groups were compared.

Geographical distribution in the District of Columbia—The geographical distribution of meningococcus meningitis cases in the District of Columbia has exhibited no unusual characteristics. In general the disease has occurred most frequently where housing conditions are bad and poor hygiene has been most commonly practised. In the white population the incidence in 1935 and 1936 was highest in the central part of the city where a large pro-

portion of the population has lived under these undesirable conditions. In this area a group of 7 census tracts, in which about 8 per cent of the white population of the city resides, furnished 28 per cent of the white cases in 1935 and 1936. The case rate for this group was 57 per 100,000 population, and for the remainder of the city's white population the rate was 12.6. However, in other scattered sections where environmental conditions were about as unsatisfactory, the case rates were about the same as those of the group described above. The incidence was generally low (10 or less per 100,000 population) in the better residential sections.

The disease was more evenly distributed in the colored population.

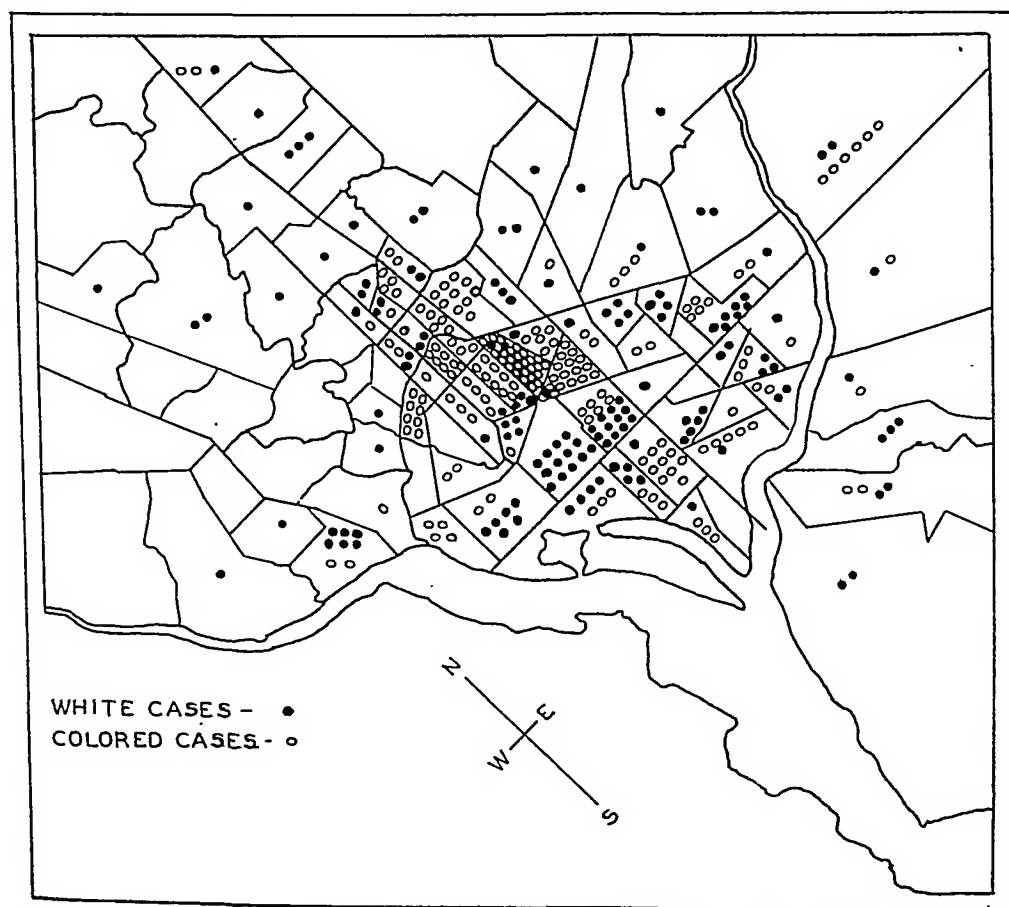


FIGURE III—Geographical Location of Cases of Meningococcus Meningitis Reported in the District of Columbia during 1935 and 1936

Sixty per cent of all colored cases reported in 1935 and 1936 came from a section roughly 12 blocks wide and 30 blocks long extending through the center of the city immediately west of North Capitol and South Capitol Streets. Fifty per cent of the colored population in the District of Columbia resides in this section. The case rate was 70 per 100,000 population. Other smaller areas in the city where there was a concentration of colored population had approximately the same incidence rate as the larger area. The more even distribution of the disease in the colored population probably occurred because a large proportion of these people have lived under conditions which have favored the spread of the disease. It should be noted that there was not a wide difference in case rates of white and colored populations, 57 and 70, respectively, which lived under somewhat similar conditions.

The first cases to be reported in 1935 came from the two areas described above and the majority of the cases reported from other areas occurred later in 1935 and 1936.

Occurrence in family groups, institutions, etc.—Multiple or second cases in family groups were not reported frequently. In 1935 and 1936, two cases in the same family occurred only once among white persons, and in two instances among the colored. Four cases occurred in one colored family.

There were numerous instances where two or three cases were reported within a short space of time from adjoining houses or in the same block. Two cases were reported from the same address but in different families on two different occasions.

Meningococcus meningitis occurred in a number of institutions in or controlled by the District of Columbia. Four cases were reported from three of the penal institutions in 1935 and 1936.

Eleven cases occurred among transients early in 1935. These men were housed in two rooming houses patronized exclusively by transients. In 1936 one case occurred in the National Training School for Boys, and in 1937 there were 6 cases in this institution. The average enrollment is about 400 boys, mostly between 15 and 20 years of age.

Study of hospital admissions—Practically all of the cases of meningococcus meningitis reported in the District of Columbia have been admitted to the various hospitals in the city. Hospital records of 118 white and 167 colored patients with the disease who were admitted to two hospitals, were reviewed for information of epidemiological interest. This group of cases, admitted during 1935, 1936, and 1937, constituted a little more than two-thirds of all the cases reported to the Health Department during this period.

In this series of cases studied, it appears that fatality rates depend more on the age of the patients than on the length of the interval between the onset and the institution of treatment. Patients whose treatment began 2 days or less following the onset had as high a fatality rate as those whose treatment began 3 to 5 days after the onset. Further analysis of the former group showed no essential difference in fatality rates of those admitted on the same day as the onset, those admitted the day after, or the second day after the onset. This group undoubtedly included nearly all of the severe or fulminating types of infection many of which succumb in spite of early and vigorous treatment.

A comparatively small number of patients were admitted to the hospital 6 to 9 and 10 days or more after the onset of symptoms. Fatality rates in the 6 to 9 day group were higher than all other groups but the number was too small to permit drawing any definite conclusions. Those admitted

TABLE III

Fatality Rates per 100 Cases of Meningococcus Meningitis Admitted to Two Hospitals in 1935 to 1937, Inclusive, by Age Groups and Number of Days After Onset of Symptoms

Days After Onset	Age Groups								Total
	Under 1 Yr.	1-4	5-9	10-19	20-29	30-39	40-49	50+	
White									
2 days and under	33.3	9.1	37.5	35.3	26.6	66.6	50.0	66.6	34.3
3 to 5 days	33.3	0	0	22.2	16.6	33.3	33.3	80.0	31.2
6 to 9 days	100.0	0	x	x	0	100.0	x	33.3	50.0
10 days and over	x	x	x	x	25.0	33.3	30.5	x	25.0
Total	42.8	7.1	33.3	30.8	25.0	60.0	37.5	63.3	34.2
Colored									
2 days and under	33.3	13.0	30.0	30.8	53.8	71.4	100.0	100.0	37.3
3 to 5 days	33.3	9.1	0	38.1	43.0	55.0	x	0	32.0
6 to 9 days	100.0	50.0	33.0	100.0	100.0	50.0	x	x	63.6
10 days and over	100.0	0	0	0	x	x	100.0	x	28.5
Total	42.8	13.0	28.0	35.7	50.0	62.5	100.0	80.0	38.3

x No Cases

on the 10th day or later had the lowest fatality rate.

It is interesting to note that fatality rates increased materially with age whether the patients were admitted early or late following the onset of symptoms.

Definite information on the different types of meningococci present in the spinal fluid or blood stream of the hospitalized cases was available for only a few cases. However, the organism was found by direct smear or by culture in about 85 per cent of all cases. The importance of typing has been pointed out by Branham.⁴

Although the type of treatment varied in the two hospitals, there was no significant difference in case fatality rates among cases of similar age. One hospital admits only children, and the other is an isolation unit of a general hospital. Antitoxin was used extensively in the former and antimeningococcus serum in the latter. In both institutions sulfanilamide or one of its derivatives was used in the treatment of a small proportion of cases in 1937.

Case fatality rates in antitoxin treated and antimeningococcus serum treated cases were essentially the same when cases of the same age were compared. The series of cases in which sulfanilamide therapy was used was too small to warrant drawing any conclusions regarding its effectiveness.

Discussion—In general the epidemiological features of meningococcus meningitis have been no different in the District of Columbia than in other large cities. There have been epidemics at irregular intervals, a greater incidence in late winter and spring, a greater incidence in colored persons, a relatively high ratio of male to female cases, and a higher case fatality in older than in young persons. The relatively high incidence and mortality rates among males has been due mainly to the great excess of cases in males from 20 to 40 years of age. Differences in occupation and other environmental factors leading to more frequent exposure to infection have been suggested to account for the greater incidence in males. The fact that case fatality rates

are essentially the same for groups of males and females of the same age lends weight to this suggestion.

Studies in which the effect of various therapeutic agents, particularly sulfanilamide, on the fatality rate of meningococcus meningitis have been reported, were reviewed by the author. Few reports seem to indicate that careful thought has been given certain factors, other than the form of treatment, which affect fatality rates. These factors are: (1) age distribution of cases; (2) type of organism found; and (3) the period of time in which the cases occurred. In order that valid conclusions may be drawn, it is essential that the age distribution of specially treated and control groups be the same, or a sufficient number of cases in various age groups must be included in each series. The classification of cases according to type of meningococcus found is also essential in appraising the effects of various forms of treatment. Series of cases must extend over the same period of time because of the possibility of differences in virulence of the organism from year to year.

Banks⁵ in his report on sulfanilamide treatment of meningococcus meningitis took the above mentioned factors into

consideration and concluded that sulfanilamide was an effective therapeutic agent. Other reports^{6, 7, 8} are less convincing because there are no definite data with respect to factors other than treatment. The superiority of sulfanilamide over other forms of specific therapy does not seem to have been demonstrated satisfactorily up to the present time.

NOTE: The author wishes to take this opportunity of thanking Dr. Sara E. Branham of the National Institute of Health for helpful suggestions in the preparation of this manuscript.

REFERENCES

1. Pope, A. S., and White, J. L. An Epidemiological and Bacteriological Study of Epidemic Meningitis in Chicago. *J. Prev. Med.*, 3:63-76, 1929.
2. Norton, J. F., and Gordon, J. E. Meningococcus Meningitis in Detroit in 1928-1929. *J. Prev. Med.*, 4:207-214, 1930.
3. Hedrich, A. W. The Movements of Epidemic Meningitis, 1915-1930. *Pub. Health Rep.*, 46:2709-2726, 1931.
4. Branham, S. E., and Carlin, S. A. A Study of Meningococci Recovered in the United States Since 1930. *J. Bact.*, 34:275-284, 1937.
5. Banks, H. S. Serum and Sulphanilamide in Acute Meningococcus Meningitis. *Lancet*, 2:7 (July 2), 1938.
6. Schwenher, F. F., Gelman, S., and Long, P. H. Treatment of Meningococcus Meningitis with Sulfanilamide. *J.A.M.A.*, 108:1407, 1937.
7. Willen, L. J. Sulfanilamide Therapy in Meningococcal Meningitis. *J.A.M.A.*, 110:630, 1938.
8. Waghelstein, J. M. Sulfanilamide in the Treatment of 106 Patients with Meningococcus Infections. *J.A.M.A.*, 111:2172, 1938.

A Permanent Nephelometer from Pyrex Glass

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THE use of nephelometry in the standardization of bacterial suspensions has been greatly handicapped because of the instability of the standards usually employed. Standards made with the actual organisms rapidly undergo autolysis even in the presence of strong bacteriostatic agents, and those prepared by chemical precipitation methods have the disadvantage that the crystals grow by accretion and one is soon reluctant to depend upon them. Barium sulphate standards¹ and the usual silica standards² have the additional disadvantage that when the proper turbidity is reached transmitted light assumes a greyish-white opalescence, whereas, the bacterial suspension has an amber cast. This discrepancy is due for the most part to the difference in size of the particles.

A method for reducing pyrex glass chips to the size of bacteria and grading them for nephelometric work was discovered entirely by accident while preparing glass chips for grinding rabbit brains for rabies vaccine. Discarded pyrex beakers and flasks were broken into chips about one-half to one inch in size and were placed in a pyrex flask or wide mouth bottle to about one-fourth of the capacity. They were then covered with distilled water and

placed on a shaking machine. This machine was run for 45 minutes over a 4" arc at 120 strokes per minute in order to remove the rough edges from the chips. For lack of sink space the distilled water from these chips was decanted into a cylindrical discard jar. After several days it was noted that the turbid liquid had settled into several distinct layers, one of which closely approached the appearance of typhoid vaccine. Noting this, we became interested in preparing a set of vaccine standards which would not settle out as rapidly as the freshly prepared barium sulphate standards which we had been using. The turbid layer of the glass suspension which most closely resembled the typhoid vaccine was siphoned off and concentrated by evaporation in order to make a range of standards. The glass standards were then calibrated by preparing bacterial suspensions of known count (Helber cell, Wright and Hopkins tube methods) and matching the concentrated solution by dilution to the bacterial standards. The resulting glass standards could not be differentiated from the bacterial suspensions whether in transmitted or reflected light. When the particles were measured it was found that they varied from 0.5 to 3.5

microns in diameter, which is the range of most of the organisms in which we were interested.

The difference in the size of these glass particles and freshly prepared barium sulphate is readily shown if one filters these suspensions through a very hard filter paper. The barium sulphate particles are removed by this filtration but the glass suspension remains turbid. This filtration method has been used by one of us to grade the size of the particles, rather than the sedimentation or centrifugation methods.

The rate of settling of the glass standards is much slower than that of the usual silica or barium sulphate type. Pyrex standards, properly prepared by this technic, will not settle out completely within 3 weeks although signs of sedimentation will be noted within 24 hours. They can be resuspended immediately by shaking a few times and will show no signs of accretion. The chemically precipitated standards will settle out completely within a few hours. Microscopic examination of the glass standard reveals "Brownian movement" similar to that noted in suspensions of bacteria of comparable size and density.

The accuracy of these standards will be seen in Table I.

This accuracy with a nephelometric method is possible only when using standards which match the suspensions in transmitted and reflected light. It is therefore necessary that the size of the particles in the standard be within the size range of the bacteria in the suspension.

TABLE I
Comparative Counts With Typhoid Vaccine

Stock	Nephelometer Reading	Direct Count
		With Levy Hausser Counting Chamber
1 T*	21,000 M	20,600 M
2 T	23,000 M	22,000 M
3 T	25,000 M	24,100 M
4 T	25,000 M	26,000 M
5 T	26,000 M	25,200 M
6 T	18,000 M	15,000 M
7 T	23,000 M	20,300 M
8 T	23,000 M	22,000 M
9 T	29,000 M	27,600 M
1 A†	24,000 M	23,400 M
2 A	27,000 M	26,700 M
3 A	27,000 M	29,000 M

* Stock T is a combination of 6 strains of *Eberthella typhi*.

† Stock A was made from the Kessel stain No. 501 A.

The stability of these pyrex glass standards is shown by the fact that standards which have been in constant use for 5 years give the same reading now as when originally made. The glass particles measure the same and show no tendency to clump, cement or dissolve. Because of the fact that pyrex glass is not affected thermally or chemically by any of the methods commonly employed in sterilization, these standards can be sealed in ampules and autoclaved to prevent mold or bacterial growth which would interfere with their accuracy.

REFERENCES

1. McFarland, Joseph. The Nephelometer: An instrument for estimating the number of bacteria in suspensions used for calculating the opsonic index and for vaccines. *J.A.M.A.*, 49:1176, 1907.
2. American Public Health Association. *Standard Methods for the Examination of Water and Sewage*. Seventh Edition, 1933, p. 6.

The Occurrence of Atmospheric Lead Resulting from Use of Colored Blackboard Crayons

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THE Wisconsin State Board of Health was recently requested to analyze two samples of yellow blackboard crayons suspected of containing lead. The analysis showed they contained respectively 7.0 and 8.8 per cent lead. Subsequent discussions with school officials disclosed that yellow blackboard crayons were extensively used, especially in defective vision classes. The present tendency of substituting light colored writing surfaces for blackboard necessitates the exclusive use of colored crayons. The possibility of lead poisoning due to inhalation of lead dust produced while using some of the colored crayons became apparent and the problem seemed sufficiently important to warrant investigation. The investigation was divided into 3 portions, (a) evaluation of the lead content of crayons, (b) determination of the amount of crayon used under various classroom conditions, and (c) amount of lead present in the air when crayons containing lead pigment were used.

Twenty-seven crayons representing 6 different manufacturers were analyzed for their lead content. The crayons were obtained from various schools or school supply houses in Wisconsin without selection. Lead was determined

by electrolytic separation, interfering metals being eliminated in the procedure. The analytical results are given in Table I. Of the samples analyzed, lead was found only in the yellows, oranges, and greens, the quantity varying between 1.5 and 12.0 per cent by weight. These results are in accord with those reported by Jephcott.¹ One yellow crayon was submitted for analysis which contained no lead pigment, and information has been obtained that another manufacturer is developing a lead-free yellow crayon.

RATE OF CRAYON USAGE

Studies made in actual classrooms showed that the amount of crayon used varies considerably, depending on the type of work. In two of the grade school rooms visited, only 0.1 gram of crayon was used in each during the entire afternoon, while in one university class 7.9 gm. were used during a period of 1 hour. It seems reasonable to expect that where a number of students are doing board work, the amount of chalk used would exceed the maximum observed.

To obtain a crayon usage unit for subsequent experiments, the amounts of crayon used by 8 persons writing a standard sentence for a given time were

TABLE I
Lead Content of Blackboard Crayons

<i>Manufacturer</i>	<i>Color</i>	<i>Wt. of Stick of Crayon in Grams</i>	<i>Per cent Lead</i>
A *	Yellow	4.2	8.8
B *	Yellow	10.8	7.0
B *	Yellow	4.9	8.9
C	Yellow	6.0	10.3
D	Yellow	5.7	12.0
C	Pale Yellow	5.8	8.4
C *	Pale Yellow	10.6	1.5
C †	Pale Yellow	10.5	0.0
D	Pale Yellow	5.2	5.2
C	Salmon	5.5	6.6
D	Salmon	4.5	1.5
D	(Poster chalk) Salmon	38.4	8.2
D	(Poster chalk) Orange	34.7	4.2
C	Dark Green	4.6	6.7
D	Dark Green	5.3	6.6
C	Light Green	5.7	7.0
D	Light Green	5.5	9.8
D	(Poster chalk) D. Green	32.1	3.7
D	" " Red	25.0	0.0
D	" " Lavender	30.6	0.0
D	" " Brown	34.7	0.0
D	" " Black	30.6	0.0
E	Light Blue	3.8	0.0
A	White	9.0	0.0
A	White	4.6	0.0
E	White	9.9	0.0
F	White	5.6	0.0

* Chalks commonly used in place of white in classes for children with deficient eyesight

† A lead-free yellow blackboard crayon recently placed on the market as a substitute for lead pigmented crayons

determined. The average was found to be 0.28 gm. per person per minute of actual writing, with a maximum of 0.58 and a minimum of 0.10 gm. Preliminary experiments also showed that for a given period of writing, the amount of crayon usage from a 5 gm. stick was approximately the same as from one having twice the density.

DUST EXPERIMENTS

The studies relative to the amount of crayon dust dispersed into the atmosphere were divided into two parts—those made in a room under controlled conditions and those made in actual classrooms.

Air samples were obtained with a Greenburg-Smith all glass impinger

using 5 per cent nitric acid solution as the collecting medium. The concentration of lead was determined by the dithizone method of Harrold, Meek, and Holden.²

The room used for the controlled experiments was 38 by 14 by 11½ ft. high and was provided with mechanical ventilation. The outlet grill was located to the right of and 6 ft. from the blackboard. Air entered the room through a door at the rear. Atmospheric samples were collected at two points, one adjacent to the blackboard at the breathing zone of the individual writing and the other in the center of the room at a height corresponding to the breathing level of students.

The variable factors in the controlled

tests were crayon used during a given time and the amount of ventilation provided. Crayon usage was varied between 1 and 10 gm. per $\frac{1}{2}$ hr. period. During Series A, the amount of air removed was approximately $1\frac{1}{2}$ cu. ft. per min. per sq. ft. of floor area, and during Series B, $\frac{1}{4}$ cu. ft. per sq. ft. of floor area.

The data from the controlled experiments are given in Table II. The air samples were collected during two periods, Periods I and II. During Period I, previously weighed amounts of yellow crayon containing 6.8 per cent lead were used in periodic writing for 30 minutes. Air samples were collected adjacent to the blackboard and in the center of the room throughout the period. Immediately following Period I, a second set of air samples was collected for 30 minutes (Period II) at the same locations. No writing or erasing was done during this period. In

some cases, a third set of samples was collected beginning 70 minutes after writing had ceased and continuing for 30 minutes.

The data in Table II show that when using 6.8 per cent lead crayons, the concentration of lead in the air may at times exceed the $1\frac{1}{2}$ mg. of lead per 10 cu.m. of air recommended by the U. S. Public Health Service as the maximum amount permissible for prolonged exposure. The data further show that during the writing period, the amount of lead at the breathing zone of the person writing is dependent on the rate of crayon usage. During the writing period the lead was dispersed throughout the room air, but in all cases the concentration was below that at the blackboard. The maximum concentration of lead found in the samples collected 70 minutes after writing ceased was 0.2 mg. per 10 cu.m. of air.

The second group of tests was con-

TABLE II

Lead Concentration in Air Under Controlled Conditions

Concentration of Lead Dust in the Atmosphere Expressed in Milligrams of Lead per 10 Cubic Meters of Air

Grams of 6.8 % Lead Chalk Used During 30 Minute Writing Period	Adjacent to Board		Center of Room	
	Period I	Period II	Period I	Period II
	Periodic Writing for 30 Minutes	0-30 Minutes After Period I	Periodic Writing for 30 Minutes	0-30 Minutes After Period I
	Series "A"			
1	0.5	0.3	0.3	0.2
3	0.9	0.2	...	...
5	1.0	0.2	0.4	0.2
10	2.2	1.5	...	...
10	5.3	0.3	1.9	0.4
10	1.3	0.2	0.6	0.2
Series "B"				
1	0.5	0.2	0.4	0.2
3	0.6	0.2	0.4	0.3
5	0.8	0.3	0.5	0.3
10	1.7	0.5	0.9	0.4
10	2.3	1.3	..	..

TABLE III
Lead Concentration in Air of Several Classrooms

Run Number	Room in Which Test Was Made	Room Conditions Typical of	Mechanical Ventilation	Per cent of Lead in Chalk Center of Room	Conditions Prior to Sampling Period		Conditions During Sampling Period		Concentration of Lead in Atmosphere—mg. of Lead per 10 cu.m. of Air
					Grams of Chalk Used	Period Over Which Chalk Was Used, in Hours	Grams of Chalk Used	Sample Collecting Period in Hours	
1	A*	Winter	No	1.5	9.5	4	0	1.4	0.2
2	B*	Winter	No	1.5	3.0	1	0	1.0	0.4
3	B	Winter	No	1.5	0	..	3.8	1.0	0.8
4	A*	Spring	No	6.8	8.4	4	0	0.9	0.1
5	B	Summer	No	6.8	2.9	1	5.3	0.8	0.3
6	B	Summer	No	6.8	8.2	2	0	0.8	0.0
7	C	Winter	Yes	8.0	13.0	1	17.0	1.0	1.3
<i>Adjacent to Board—Writing and Erasing</i>									
8	B	Summer	No	6.8	0	..	2.9	0.8	0.2
9	C	Winter	Yes	8.0	0	..	13.0	1.0	5.9

* Chalks commonly used in place of white in classes for children with deficient eyesight

ducted in 3 classrooms A, B, and C. Due to the noise created by operation of the impinger apparatus, it was not feasible to collect air samples while the classes were in progress. Runs No. 1, 2, and 4 were made immediately after class had been dismissed. The remaining 6 runs were made in classrooms where no classes were in progress.

Classroom A was 74 by 13 by 11½ ft. high, and Classroom B, 20 by 15 by 10¾ ft. high. Neither of these rooms was provided with mechanical ventilation, the only ventilation being that occurring naturally through doors and windows. To vary conditions in room B, the doors and windows were open to different degrees, thereby simulating conditions as existing during winter, spring, and summer. Room C was 29 by 26 by 15 ft. and was provided with mechanical ventilation.

Data from this series of tests are given in Table III. The results were in agreement with those of the controlled group in that ordinarily the

concentration of lead in the air at the center of the room was below 1.5 mg. per 10 cu.m. of air. However, under adverse conditions it seems reasonable to expect that higher concentrations of lead may occur. During Run 9, in which 13 gm. of crayon were used in 1 hour's writing, the concentration of lead in the air at the blackboard was 5.9 mg. per 10 cu.m. During Run 7, the concentration of lead at the center of the room was 1.3 mg. of lead per 10 cu.m. of air. Thirteen gm. of 8.0 per cent lead crayon were used prior to Run 7, and 17 gm. during the run. The quantity of crayon appears to be high but on the basis of data obtained from actual crayon usage, indications are that conditions would be comparable to a class of 15 students each writing 7 minutes out of 2 hours.

Individuals subjected to the greatest lead exposure are teachers and students writing at the boards, and janitors cleaning boards, erasers, and classrooms.

When it is considered that children

appear to be more susceptible to lead intoxication than adults, the desirability of replacing lead chromate as a pigment is apparent. In addition to the possibility of lead absorption by inhalation, the danger of ingestion by nibbling pieces of crayon as pointed out by Jephcott should not be ignored. The fact that at least one manufacturer has produced a yellow crayon free of lead shows that the hazard can be eliminated.

SUMMARY AND CONCLUSIONS

1. Of the 27 samples of blackboard crayons analyzed, lead was found to be present only in various shades of yellow, orange, and green. The maximum quantity of lead found

was equivalent to 12 per cent by weight.

2. One sample of yellow blackboard crayon contained no lead.

3. Where colored crayons containing appreciable quantities of lead are used, the concentration of lead in the classroom atmospheres may exceed the toxic limit of 1.5 mg. per 10 cu.m. of air as determined by the U. S. Public Health Service.

4. In view of the potential health hazard involved in the use of lead as a pigment in colored crayons, this material should be replaced by one which is non-toxic.

REFERENCES

1. Jephcott, C. M. Lead in Certain Coloured Chalks and the Danger to Children. *Canad. Pub. Health J.*, 28, 8:391-393, 1937.
2. Harrold, G. C., Meek, S. F., and Holden, F. R. Practical Method for Rapid Determination of Lead When Found in the Atmosphere. *J. Indust. Hyg. & Toxicol.*, 18:724, 1936.

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TUBERCULOUS INFECTION DUE TO MILK

WHILE the danger to human beings from bovine tuberculosis is now universally recognized, very seldom have what might be called acute epidemics of tuberculosis been recorded, and still more rarely has the outbreak been traced to a single cow with recent tuberculosis of the udder. Hence the outbreak in Sweden recently reported¹ is of more than usual interest and emphasizes the necessity of vigilance.

In August and September of 1936, in the village and municipality of Horred, Sweden, several children showed tuberculous symptoms for which no human source of infection could be found. By the middle of October, 30 cases had been recorded. Altogether, 56 infected persons were discovered of whom 9 were from 13 to 64 years of age. Among 102 children who did not consume milk from the tuberculous cow there were only 8 positive reactors, while of 32 who were known to have consumed this milk, 29 were positive. Of 29 children under school age, 11 who did not take any of the infected milk all gave a negative reaction, while of 18 who drank the milk, 16 gave a positive reaction. Since 1935 all inhabitants of Horred except those who had their own cows, have been obliged to drink the milk from the Horred dairy. Pasteurized milk was objected to on account of its boiled taste so that the milk for drinking purposes was consumed raw.

A striking point is that the herd was one which since 1935 had been attached to the State subsidized organization for the prevention of tuberculosis in cattle. It had been physically examined in May, 1935, when one cow was taken out on account of tuberculosis. Another examination was made in May, 1936, when no tuberculous animals were discovered. In September, 1936, a third clinical examination was made and at that time samples of milk from the 22 animals of the herd were taken for bacteriological examination. One cow showed clinical mastitis but tuberculosis was not suspected. However, her milk was found to contain many tubercle bacilli demonstrable on centrifugation and staining. This cow was slaughtered at once. Post-mortem examination showed recent tuberculosis, mostly in the right lung and pleura. There were diffuse peritoneal

deposits and a number of mesenteric glands were enlarged and showed caseous foci. The left half of the udder was enlarged and hard, and numerous tuberculous foci were found.

It is plain that milk from a cow with active tuberculosis of the udder was consumed by most of those children who developed tuberculosis, while others who did not drink this milk escaped. There is no statement that tubercle bacilli were isolated from these children and proved to be bovine, though the history justifies this conclusion.

It is clear that clinical examination of cattle to detect tuberculosis is not to be wholly depended upon. This herd was under a State organization whose object was the prevention of tuberculosis in cattle in an infectious form. Presumably more than common care was given to this herd. Apparently the veterinary inspection was done by competent men, yet not until a number of children became ill was it suspected that the herd contained an animal excreting tubercle bacilli in its milk.

The second lesson is that tuberculin tests of cattle supplying milk for market purposes should be made at regular intervals. The third lesson, and perhaps most important, is that all milk for drinking purposes should be pasteurized.

In view of this history it is surprising that the Swedish Parliament in 1938 passed an act regulating the sale of milk and cream for human consumption under which exemption may be granted from compulsory pasteurization of milk not only from cows which do not react to tuberculin, but also from those which have passed a clinical examination. It is clear that under such exemption the users of the milk are not entirely safe, as this tragic outbreak demonstrated. Again the necessity of pasteurization has been shown in a striking manner.

REFERENCE

1. Stahl, Simon. A Tuberculosis Epidemic Caused by Milk-borne Infection. *Brit. J. Child. Dis.*, Apr.-June, 1939, p. 7.

A NEW NAME FOR DRY MILK SOLIDS

NEARLY a quarter of a century ago, when skim milk usually was regarded as a waste product, definitions for "skim" or "skimmed" milk and "dried skimmed milk" were adopted by the federal government and most of the states. These official names and definitions usually have remained unchanged to the present day, although the conditions of use and the nutritional appreciation of these products have greatly changed.

In recent times, the so-called dried skimmed milk has become an important article of commerce, and significant as an actual and potential contributor to human nutrition, as well as to animal feeding.

While pasteurized or certified whole milk is properly recognized as our most nearly perfect food, much of its food value is actually below the cream line. Removing the butterfat from whole milk may take away this source of food-energy and the vitamins, A and D, associated with it, but there remain practically all of the valuable minerals, proteins, lactose, and other vitamins of the original milk.

When these important non-fat milk solids are dried, the resulting product is a concentrated and inexpensive source of the food-minerals, calcium and phosphorus, and of milk proteins, milk sugar, and certain vitamins. Dry milk

solids are rich in vitamin B₂ (riboflavin) and represent a good source of vitamin B₁ (thiamin), as well as of other components in the vitamin B complex.

The most extensive modern use of dry milk solids of this type is in the baking industry, which now purchases about 100,000,000 pounds annually for inclusion in white bread and cake. The growth of this desirable use of milk solids in bread is indicated by the fact that in 1923 less than one-third of this quantity was obtained by bakers. Dry milk solids are also widely employed in the making of confectionery, in certain meat products, and in various other food industries.

Because of the present wide use of dry milk solids and the unfortunate connotations of the words "skim" or "skimmed" in the public mind, it has been suggested that official designations of this product be changed from "dried skimmed milk" to "dry milk solids not over 1½ per cent fat," a definition which already has been adopted in two or three states. Since this terminology would permit of accurate and truthful labelling of a wholesome product, and would tend to remove the popular misconception about the real value of skimmed milk, the proposed new definition seems reasonable and deserves favorable consideration.

ADVANCE IN FOOD HANDLING

IT is well inside of the truth to say that one of the great problems of the world today is—as it always has been—food. With increasing populations the carry over from the season of plenty—in other words, the preservation of foodstuffs—has grown in importance. The scientific student of nutrition has investigated what happens to foods during the processes necessary. Are their wholesome qualities preserved, destroyed or impaired? The commercial food purveyor has been quick to recognize the scientific aspect. Extensive laboratories are maintained, staffed by outstanding experts provided with every facility for the best work. Volumes are pouring forth on almost every aspect of nutrition but not enough has been told the public about the practical aspects of food preservation. The advances made in handling and preserving foods are fully as notable as the scientific discoveries concerning the foods and equally as necessary for good results. In a very few years we have advanced from the wooden container to stainless steel, which now holds the stage as the best material so far discovered for use in plants devoted to the preparation of foods. It also is largely used in kitchens and pantries on ships as well as on land. It finds wide use for cutting and serving tables and containers for keeping foods hot in eating places for which it is particularly good since foods may be kept for any length of time without damage or change. Breweries are adopting it for storage and for transportation, while piping is largely employed for service in bars.

After many experiments it has been found that a low-carbon steel (0.1 per cent) to which 18 per cent of chromium and 8 per cent of nickel is added is most satisfactory, having a high corrosion-resistance, yet being remarkably ductile and workable. Sheets and plates of such composition can be rolled and bent to shape, are suitable for press work, deep-drawing (milk and ice cream cans, for instance), can be welded by any of the several methods, except hammering, to form smooth and homogeneous joints which can be readily polished. This is important as the material exhibits its best corrosion resisting properties when the surface is free from films or scales. It is amenable to brazing, hard or soft soldering, etc., but these processes are not recommended these days in milk or food plants.

No metals except the noble ones have such a wide range of resistance as stainless steel. It is not attacked by any of the ordinary foods or food acids and as a consequence does not give off to the foods dissolved metal, hence their flavor, color keeping qualities, etc., are not changed. It is very tough and resistant to wear and tear, scratching and distortion, points of importance in the consideration of new installations, since the greatly prolonged life compensates for the higher first cost. The expense of maintaining a clean and hygienic plant is reduced to a minimum. Hot caustic soda does not affect it at all, so can be used for washing without fear of damage. It is the same throughout its mass, not depending on a metallic coating of veneer, consequently there is nothing to peel or wear away.

Certain brines employed in cooling systems, notably calcium chloride brine, are liable, under certain conditions, to pit the steel. This feature has been taken care of by incorporating into the 18 chromium-8 nickel type of stainless steel from 0.5 to 1 per cent of silver, which forms "on the exposed surface of the steel a continuous self-healing film of a silver compound originating from silver which is intra-granularly included in the steel."¹

So far the milk industry is one of the largest users of stainless steel equipment. In many new plants it is specified throughout. In this country the so-called glass-lined tank is still used for rail transportation over long distances. In England milk is carried to central depots from the farm in "churns" where it is transferred to stainless steel tanks, mixed in other tanks of this material, then pumped into insulated stainless steel rail tank wagons for transportation. In the great city plants the pasteurizers, holders, cooling tanks, filling machines, and bottle platforms are all of stainless steel. In the newest plants for the production of milk powder stainless steel is used throughout.

The increasing use of stainless steel in all the various types of food handling, preservation, preparation, and serving, especially in public places, is to be welcomed as marking a distinct advance from the public health point of view as well as from that of the manufacturer.

REFERENCES

1. *Indust. & Eng. Chem. (News Ed.)*, June 10, 1939.
2. *J. Roy. San. Inst.*, LIX, 12.

BOOKS AND REPORTS

Medicine in Modern Society—By *David Riesman*. Princeton, N. J.: Princeton University Press, 1938. 226 pp. Price, \$2.50.

Based upon his rich experience as professor of clinical medicine and of medical history, Dr. Riesman here presents a thoughtful interpretation of medicine addressed primarily to intelligent laymen. The purpose of the work is clearly implied in the question posed at the start: "Is it not just as important for the cultured man to know something of the history of the circulation of the blood, of vaccination, of anesthesia . . . as it is to know the story of the Punic Wars . . . ?" It is a sad fact that history, as taught in the schools, still largely omits the vital story of science in general and of medicine in particular, and Dr. Riesman here shows how effectively this theme can be and should be developed.

The book begins with a historical survey which emphasizes the medical progress of the 19th and 20th centuries. The discussion of recent developments in such fields as allergy and nutrition is clear and specific, so that the lay reader will find in it not only cultural background, but also information valuable for his own health. There then follow a number of chapters on special topics, such as cancer, the neuroses, and healing cults. These also are presented in a simple yet authoritative manner. Something of the wisdom of a tolerant medical philosopher creeps into all of these essays. Indeed, it is the blending of scientific with human understanding—of science and art—which affords one of the chief charms of the whole work.

The final sections are addressed to

the medical profession as well as to the laity, and contain chapters on medical education, ethics, and the social outlook. In dealing with the difficult and controversial questions involved in "socialized medicine," Dr. Riesman naturally displays a full appreciation of the great services which the medical profession has afforded society, and notes the importance of protecting this group against any changes which would limit its real usefulness. He also faces squarely the lack of medical service available to certain classes, and the consequent need for some type of professional organization to meet this need. Certain of the usual objections made to various plans for "social medicine" he finds untenable; and his final conclusion is that some form of health insurance for the middle classes, under the control of the organized profession, offers the best way out of present difficulties. All in all, this is a most sane and thoughtful book, the sort of work which should be made a part of the training of all well educated citizens.

RICHARD H. SHRYOCK

The Treatment of Clinical and Laboratory Data. An Introduction to Statistical Ideas for Medical and Dental Workers—By *Professor Donald Mainland*. Edinburgh: Oliver & Boyd, Ltd., 1938. 340 pp. Price, \$4.50.

The author is a professor of anatomy at Dalhousie University who, in the course of his work, became impressed with the importance of modern statistical methods, and, having searched out such methods for himself, undertakes in this book to give laboratory and clinical workers the benefit of his

findings. The viewpoint and technics advanced in the book follow closely those of R. A. Fisher, thus providing another example of the immense influence that Professor Fisher continues to wield on the newer recruits to the art of statistics. Very largely the book concerns itself with tests for "significance," by which one can "make adequate allowance for chance in all observations." It gently but firmly castigates medical and dental investigators for neglecting consideration of chance variation, and opines that they have therefore frequently gone astray in their conclusions. The reviewer cannot, from his own experience, conscientiously agree that so many casualties are attributable to this particular weakness, but there can be no doubt that good quantitative work should take account of "chance" variability.

In the one illustration of the fallacies which result from the neglect of statistical tests elaborated by the author, we side with the writer criticised. The occasion for criticism is a report on the effectiveness of serum treatment in mitigating paralysis or death during an epidemic of poliomyelitis. The report found a significant difference in the percentage of cases untowardly affected in the treated and untreated groups, but, self-critically, the report said, "A criticism may be raised. Are not the more favorable results observed in the serum-treated cases due to the fact that they are milder cases . . . ? We may answer it from several different angles. . . . Following Draper's view that a cell count in the spinal fluid of over 100 indicates a serious type of disease, a comparison of the cell counts in treated cases and controls shows no appreciable difference in numerical incidence of the counts, from which it would follow that there is no significant difference in the average severity of the two groups of cases." It is this argument in the re-

port that the author criticises. He says, "Now it is possible from the report to test the association between cell count and severity of disease. The table on p. 81 quotes numbers of cases in each instance. In neither set of cases is there a significant association between cell count and severity of the disease; therefore it is not permissible to use the cell count as a criterion of severity in the cases under investigation."

Why is it not permissible? The authors of the report did not in the first place rest their use of the cell count as an index of severity on their own investigation, which had another purpose, but on Draper's, and unless evidence is adduced which casts doubt on the validity of Draper's work, there is nothing relevant here. Do the data obtained by the author from the report and presented as a table (p. 81) refute the conclusion of Draper that there is a correlation between severity of disease and cell count? On the contrary, we find on examining the table that it confirms Draper throughout! In the non-treated group as well as the treated group, the rate of incidence of death or paralysis is considerably greater in the patients with high cell counts. On what then did the criticism of the author rest? Apparently on the fact that the difference between the incidence in the high and low cell count groups was not "significant" in the technical sense that the chi-square P did not reach some arbitrary low level.* But this would be relevant only if the report were trying to prove from its own observations that cell count was correlated with severity of disease. Actually the report rested this con-

* For the experience as a whole, this reviewer finds that the difference in incidence between the high and low cell count groups is +16 per cent, and the probability of such a difference on the assumption of chance variation alone is 0.04. Such a small P would be, for some statisticians, enough evidence to indicate a correlation even if there was no other evidence available!

clusion on Draper's work, not the present investigation, and it does not appear clear to us how the confirmatory findings in the investigation, even though if taken alone they would not be considered sufficient to *establish* the correlation, should be held to cast *doubt* on the correlation previously found.

There are arguments in other parts of the book which similarly overstress the importance of a "P" found from some statistical test, to the exclusion of what appears to us as more important considerations. However, enough has been said to indicate why, in the opinion of this reviewer, though a medical or dental worker will find much that is interesting and useful in this book, it will be hazardous for him to accept it as the last word.

JOSEPH BERKSON

Alcohol in Moderation and Excess
—By J. A. Waddell, M.D., and H. B. Haag, M.D. *Richmond, Va.: William Byrd Press, 1938. 184 pp. Price, \$1.00.*

The General Assembly of Virginia in 1936 adopted a resolution requesting the University of Virginia and the Medical College of Virginia to provide a report on "The effects of the use of alcohol upon the human system in respect to both moderate and excessive use thereof." In consequence, a report was prepared by two professors, one in each of the two institutions named, with the collaboration of six other faculty members. The report was prepared primarily as a source book for school teachers rather than as a text.

When the General Assembly met in 1938 the manuscript was referred to the Senate with the expectation that it would be printed as a Senate document. Prior to the convening of the General Assembly, however, a summary of the report had been made public, and a protest was made by the dry

organizations of the state against the printing of the document. It was not printed by the Senate. Later the House ordered that the report be printed, so its members might read it, but the protest of the "drys" was again effective; all copies were ordered burned.

Subsequent to the rejection of the report by the Assembly, the manuscript and copyright privileges were returned to the authors and the book was published commercially. The material in the present edition is the same as that used in the edition burned.

The book first provides material on the properties of alcohol and certain pertinent physiological data. It then deals with the effect of alcohol on the central nervous system, and, somewhat less fully, with its effects on the respiratory, circulatory, and digestive systems.

According to the authors, much of the information on the effect of alcohol is in a state of flux and so, unfortunately, many vital questions still remain debatable. The authors have endeavored to cull reasonably conservative deductions from the studies at hand, and the volume seems to deserve the opinion of the Virginia State Board of Education which describes it as a most valuable contribution, scientifically sound and very scholarly.

REGINALD M. ATWATER.

Educating for Health: A Study of Programs for Adults—By Frank Ernest Hill. *New York: American Association for Adult Education, 1939. 224 pp. Price, \$1.25.*

One of a series of studies in the social significance of adult education in the United States, this book describes the work of important organizations engaged in teaching American men and women to lead healthier lives. "Health education is carried on by such a multitude of public and private agencies," states the foreword, "and is so varied

in character, that it forbids a thorough treatment in a single volume."

This volume aims to give an over-all view of what is being done, indicating interrelationships, trends, and problems. The material was gathered from visits to a dozen states, many cities and counties, by a careful, critical but apparently sympathetic observer, who was primarily concerned with health education not as an aspect of health work but as a form of teaching and learning. The author has done a constructive job and rendered a valuable service from which public health educators and administrators may derive benefit.

IRA V. HISCOCK

Health for 7,500,000 People—
Annual Report of the Department of Health, City of New York, for 1937, and a Review of Developments from 1934 to 1938. New York: Department of Health, 1939. 390 pp.

This volume is more than an annual report; it is a well written review of the administrative and physical development of the Department of Health of our largest city during the 4 year period 1934 to 1938. Attractively bound and printed, with numerous charts and photographs, its informal style and simplicity of presentation insure its readability, not only to technical workers in the field, but to the public at large.

Departmental activities are outlined in four sections, the administrative section, the medical, nursing and bacteriological section, the sanitary section and the vital statistics section. Under those wide headings separate services are discussed in short chapters. Perhaps the most interesting of these is that dealing with development of the neighborhood health work. Although plans had been worked out previous to the beginning of the period under review, only one of the 30 districts into which the city had been divided had

been supplied with a health officer. In 1934 the positive initiation of the program began with the appointment of administrative staffs for seven districts. The beginning of 1938 found 13 civil service district health officers appointed as well as 7 medical officers-in-charge assigned to district work. Nine new health centers had been built and a tenth building remodeled for this purpose.

Other chapters describe the anti-syphilis campaign, reorganized tuberculosis work, pneumonia program, personnel training program, modernization of the bureaus responsible for supervision of food supplies and environmental hygiene, and the work carried on in the new William Hallock Park Laboratory. One chapter is given to the place and use of federal grants in the health program.

The vital statistics section of the report adequately presents the main features of natality, infant and maternal mortality, and mortality in general. Standardized death rates are available by cause as well as rates by sex, color and age. In addition a number of repository tables have been included which give detailed data on trends of the principal causes of death and the sex and age distribution of deaths by cause.

J. H. WATKINS

Vitamins and Vitamin Deficiencies—
By Leslie J. Harris, Ph.D., Sc.D.
Philadelphia: Blakiston's, 1938. 204 pp. Price, \$2.50.

This is the first volume of a series to be published under the general title of Vitamins and Vitamin Deficiencies. This volume is entitled Vitamin B₁ and Beri-beri—Introductory and Historical.

This is a very interesting little book. The author states that his aim has been to provide a "comprehensive synopsis." He has done this.

An enormous amount of research is reviewed but there is no attempt to

give detailed information on any point; an excellent bibliography accompanies each chapter. There are a good many illustrations which add greatly to the value of the book. Pictures of 8 outstanding pioneers in the study of vitamins are given: Lind, Takaki, Eijkman, Grijns, Holst, Hopkins, Funk, and McCollum.

The following sentence taken from the Foreword by Sir F. Gowland Hopkins is a fitting close to this brief review:

I can strongly recommend the book to all students who desire acquaintance with the present position and outlook in the field of vitamins, and believe that the specialist will welcome an admirable summary of the facts available to-day and a bibliography fully up to date.

NINA SIMMONDS

Macmillan's Modern Dictionary
—*Edited by Bruce Overton. New York: Macmillan, 1938. 1466 pp. Price, \$3.00, with thumb index, \$3.50.*

The "Modern Dictionary" must be an efficient guide to the choice and in the use of words; it must be concise and compact, yet comprehensive in compass; it must excite the interest of the user and intrigue him to the study of words as living things; and it must by and of itself help in the development of the dictionary habit."

This excellent objective has been attained to an unusual degree. The Editor has given us something really new in dictionaries.

At first one misses the appendixes, tables of various sorts, lists of foreign words, pronouncing gazetteer, abbreviations and signs used in writing and printing, thermometric scales, etc., so often found. Macmillan's uses "one vocabulary that is peculiar to this dictionary," and in alphabetical order one finds a wealth of biographical sketches, geographical names, foreign words and phrases, and indeed information on practically every subject that one can

desire. An unusual number of idiomatic phrases are given. Slang is treated kindly in recognition of the growing character of our language, but is properly labelled as such. Many colloquialisms are given.

A decided departure is the omission of illustrations. The editor believes that they have been used to embellish the pages rather than to clarify definitions, and points out that great areas of knowledge such as mathematics, philosophy, psychology, theology, sociology, and other department of human intelligence, although contributing a much larger vocabulary, are scantily illustrated.

The only practical way to judge a dictionary is to use it day by day. By this test the reviewer has found it modern in every respect, easy to use, well printed and helpful. A curious omission is the word "pyrology," the derivation of which seems plain, but for which there seems to be little agreement as to definition. The *Scientific Monthly* for June, 1939, uses the word to mean the "science or technology of fire control."

Macmillan's can be recommended to those for whom it is designed—businessman, speaker, writer, general reader or student. MAZÏCK P. RAVENEL

Getting Ready To Be a Father—
By Hazel Corbin. New York: Macmillan, 1939. 48 pp. Price, \$1.25.

This little volume is so interestingly written, effectively illustrated and printed, that one is likely to read it through at one sitting and wish that every man who is "expecting a baby" might have a copy to profit by the experience of George Halladay, the hero of this story. Here is contained useful information given in classes for prospective fathers dealing with maternity care from the father's point of view, selection of hospitals, physicians and nursing care, guides in meeting the physical

and psychological problems to be faced by both parents, expenses, and suggestions for fitting the baby into the home, even to making furniture and equipment which will facilitate the care of the baby in congested quarters.

IRA V. HISCOCK

Water Supply Engineering—By *Harold E. Babbitt and James J. Doland.* (3rd ed.) New York: McGraw-Hill, 1939. 690 pp. Price, \$6.00.

In any rapidly advancing field of effort having the scope of water supply engineering, it is difficult to keep a textbook current and still not exceed a useful and convenient size. This third edition by Babbitt and Doland seems to have surmounted this difficulty.

Containing 635 pages of text and averaging almost 1 figure to every 2 pages, it covers water works finances, hydraulics; rainfall runoff and consumption; ground and surface waters with methods and devices for developing and purifying them for consumer use; the relations between water quality and diseases; and an interpretation of numerous analytical procedures available today.

As a textbook, it must necessarily be complete. This forces brief treatment of subject matter but notwithstanding that, this new volume fulfils its purpose adequately and well.

ARTHUR P. MILLER

Population, Race, and Eugenics—By *Morris Siegel, M.D.* Hamilton, Ont., Can.: The author, 546 Barton St., East, 1939. 206 pp. Price, \$3.00.

This is a good discussion of the problems of race and eugenics for the lay reader. It treats these problems simply and clearly. It is not overdogmatic nor is it as biased as is often the case when the occasional writer tackles general questions of this kind. It can be heartily recommended to the general reader who would like to get a

bird's-eye view of the eugenic situation.

The word "Population" in the title gives the impression that it treats of population questions, aside from "Race" and "Eugenics," more than it actually does, but this does not constitute a serious defect considering the purpose of the book and the public it is intended to reach.

A little more careful proof-reading would have helped it in places.

WARREN S. THOMPSON

A Textbook of Applied Microbiology and Pathology—By *Thurman Rice, A.M., M.D.* (2nd ed.) New York: Macmillan, 1939. 271 pp. Price, \$2.50.

The only important change made in the second edition of this very practical and usable text for student nurses is the inclusion of a section on General Pathology.

The material on Bacteriology has not been shortened—in fact, it appears in almost the exact form given in the first edition. By condensing the size of the type and omitting a few illustrations the actual number of pages remains the same even though approximately one-sixth of the second edition is given over to the section on Pathology, which covers, after an introduction, Congenital Abnormalities, Neoplasms, Progressive and Retrogressive Changes in Tissues, Inflammation, Circulatory System, and Circulatory Disturbance.

This additional material is presented in the same simple and interesting style which characterizes the older sections. It is not complete enough to serve as a text in a course in General Pathology, but it does supply fundamental knowledge of disease and fulfil the purpose for which it was intended. The usefulness of this added section will largely depend upon the organization of the course for which the book is used.

The drawings have been made by the

author. In most cases they are exaggerated as to size in order to emphasize special features.

The book will continue to hold its high place among texts of this type.

ANNA DEAN DULANEY

Class Fertility Trends in England and Wales, 1876-1934—By John W. Innes. Princeton, N. J.: Princeton University Press, 1938. 145 pp. Price, \$2.50.

That there exist wide differences in fertility between different social and economic classes in the population has been noted by nearly all population students since the time of Malthus. It has also often been noted that the decline of birth rates during the past half century or more seems to have widened these differences. The matter of larger families among the poor than among the more fortunate social classes, has long been of concern to both eugenicists and to some sociologists. Recently, however, there have been accumulating scattered bits of evidence which suggest the hypothesis that such fertility differences may be temporary phenomena and that the future may see a closing of the gap between the birth rates of different occupational and social classes. Some students of population are even predicting the complete disappearance of fertility differentials within the next few decades. It was to test this hypothesis of "democratization" of birth rates that the present research was undertaken.

The first part of Dr. Innes's study consists of a careful re-analysis of fertility rates by occupational classes for England and Wales. The data are drawn from the Census Report of 1911 on the Fertility of Marriage in England and Wales by the late T. H. C. Stevenson. The results of this analysis seem to point rather clearly to the conclusion that the sharp decline

in fertility which seems to have begun about 1876, proceeded at quite different rates for different occupational groups. This divergence in fertility trends for different social classes continued unabated up to the turn of the century, so that by 1900 fertility rates were both absolutely and relatively further apart than they were 25 years before that time.

In the second part of his study, the author attempts to pursue the analysis of class incidence of fertility decline beyond the period for which the report of 1911 supplies the data. Since later census reports do not provide material which is comparable with that found in the earlier report he was forced to have recourse to another approach and method. To study class differentials in fertility beyond 1911, use is made of fertility data for different boroughs and districts of metropolitan London classified into "class-areas" on the basis of socio-economic criteria. If we may accept London area-class fertility rates as comparable with English occupational class fertility rates, then the pattern of class differentials has been quite different since 1900 as compared with the earlier period. Already by 1911 the lead in the decline of the birth rate had passed from those classes of highest socio-economic status to those lower in the scale. By 1934 all fertility differences between the three higher classes had been obliterated, and the differential between classes I and IV had been reduced to an insignificant amount. Class V, that with the lowest social and economic rating, continued to retain the position of highest fertility, but the absolute difference between it and the other classes had greatly diminished and its downward fertility trend relatively had kept pace with the trends of other classes. Between 1931 and 1934 the sharpest decline in fertility was found in class V.

It would indeed be foolhardy to con-

clude from the results of this and a few other similar studies that differences in class fertility will disappear within the near future. The author warns against drawing any such conclusions even for London, to say nothing of all England and Wales. It may not be too much to say, however, that the study does give us reason to discount the alarms of the eugenists in their concern over the future quality of the population as a result of differential birth rates. Certainly the evidence presented in this study does not seem to indicate that lack of "prudence and foresight" is reproducing a special "social problem" class in the population.

Dr. Innes has made an important contribution to the literature on differential fertility. While the lack of comparable data may preclude the possibility of repetition of his methods in other countries, his study should stimulate researches elsewhere for the testing of the hypothesis of the "democratization" of the birth rate.

C. T. PHILBLAD

The Health of College Students—
By Harold S. Diehl, M.D., and Charles E. Shepard, M.D. Washington: American Council on Education, 1939. 160 pp. Price, \$1.50.

This book is a report by the authors to the American Youth Commission of the American Council on Education. It is a study of 4,800 young people and 500 institutions of higher learning. Through the CCC the Council obtained data on a large number of young men from the lower economic backgrounds. The result is a most interesting book, giving what we believe to be the most comprehensive study yet made of the population of this class and age.

It opens with a general consideration of the health of youth, goes on to give the development of college health work, discusses the problems, programs, and organization of such services, and ends

with Suggestions for Organization and Development of College Student Health Service. Three appendices give statistical tables, forms used in study, and a list of the colleges and universities which participated.

The work has been carefully done under competent direction and contains a wealth of material of great value. It is open to the criticism that a great deal of the material was obtained through questionnaires, and allowance must be made for the human disposition to present a good appearance.

The report can be thoroughly recommended to all interested in this great question and should find a place in every university and college library. The printing and binding are excellent.

MAZÛCK P. RAVENEL

Nursing Through the Years—
By Corrine Johnson Kern. New York: Dutton, 1939. 340 pp. Price, \$2.50.

The story has its beginning in the operating room of a well known San Francisco hospital as Corinne Johnson, the author, is on duty for the last time as a student nurse. The next day she is to start private practice, she has thoroughly enjoyed her student days and wonders if she will be successful and happy in her chosen life's work.

In the spring of 1900, she was employed as office assistant to Martha Purdy, M.D., who was lovable, queer yet the most tactfully impertinent human being imaginable. The doctor's life was filled with purposeful undertakings—births, surgery and medical care—the days were not long enough to care for her busy practice in that remote country town.

Her next assignment was in a country home near the Pacific Ocean. At first the attending physician was disappointed to find that a young nurse weighing only ninety pounds was sent in answer to his request, but he was more than delighted with her capable

handling of a family situation which resulted in his patient's rapid recovery.

Interwoven with the personal account of caring for patients in all walks of life from the homes of the uneducated and poor to homes of refinement and of the very wealthy, is the story of the progress in the fields of medicine and nursing.

Corrine Johnson won the respect of all with whom she associated; her happy, pleasing personality brought encouragement and hope as well as qualified nursing service to each one.

She retired to her mountain bungalow to rest but found that her chosen career of nursing suffering humanity was to keep her busy, so she continued to answer their calls any hour of the day or night.

The story is simply and sincerely told and will interest lay readers as well as professional members.

MARGARET STRONG

Man and His Health—New York: Exposition Publications, Inc., 1939. 96 pp. Price, \$.50.

The American Public Health Association has a special interest in the Medical and Public Health Exhibits at the New York World's Fair. In the late 1920's planning for an exhibit of this sort began. In 1931 a committee was appointed, and when the World's Fair was announced in 1935 this committee saw its opportunity and succeeded in interesting the Fair Corporation so that one of the most interesting exhibits at the World's Fair is in the Medicine and Public Health Building which contains the Hall of Medical Science and the Hall of Man. The exhibits are the result of the combined efforts of nearly 1,000 individuals.

The Hall of Man was designed to house the original Oberlaender Trust Collection of exhibits on anatomy and physiology. It was developed and sponsored by the American Museum of

Health. The exhibit is to satisfy Man's natural curiosity about himself, to introduce Man to Man himself. Here the anatomy and physiology of the body is illustrated, showing how man breathes, walks, digests his food, how his senses operate, and how he reproduces himself. It contains a Transparent Man of life size, showing the relation of the skeleton and organs of the body. A remarkable series of models has been developed for this purpose.

In the Hall of Medical Science are many exhibits of interest to everyone, only some of which can be mentioned, but enough to show the range of subjects of wide general interest which they cover: Maternal Health, Child Health, Normal Growth and Development, Veterinary Medicine and Public Health, Medical Education, Housing for Health, Syphilis, Infections, Immunity, and Heart and Circulation of the Blood. These have been sponsored by voluntary associations, such as the American Medical Association, American Public Health Association, American Social Hygiene Association, American Veterinary Medical Association, etc., as well as by some foundations, and a certain number of commercial firms interested in public health and the manufacture of medicinal preparations.

Each one of these exhibits is under an Exhibit Committee made up largely of persons interested in the special lines to which the exhibit refers.

The American Museum of Health, incorporated as a nonprofit educational institution under the laws of the State of New York, was created in December, 1937, and makes its debut at the New York World's Fair. Even before its dedication, June 17, more than 1,750,000 had examined the displays which it contains. The interest shown has exceeded all expectations. The day-to-day attendance runs more than a third of the paid admissions to the Fair.

The American Museum of Health has created and acquired most of the important and durable exhibits now on view in the Medicine and Public Health Building. At the conclusion of the Fair it is planned to move these exhibits to a permanent institution for visual health teaching in the City of New York. Coöperation in securing a building for the purpose has been assured.

MAZÛCK P. RAVENEL

The Comparative Values of Chest Roentgenograms Made on Film and on Paper for Industrial Surveys—*Medical Series, Bulletin No. II. Pittsburgh: Air Hygiene Foundation of America, Inc., 1939. 20 pp., 7 charts in pocket.*

This study was directed by Dr. E. P. Pendergrass of the Hospital Department of Radiology, University of Pennsylvania, while the technical aspects were developed by the staff of the Moore School X-ray Laboratory. Several leading X-ray companies and film manufacturers coöperated in the project. Of special interest, 49 roentgenologists in eastern and middle western states examined the roentgenograms and recorded their opinions in special questionnaires.

The *Bulletin* discusses The Physical Characteristics of Roentgenograms on X-ray Film and X-ray Paper, Preliminary Experimental Procedure, Roentgenographic Exposure Techniques, Test Roentgenograms and Questionnaires, Physical Data of Test Roentgenograms, Roentgenologists' Comments on Test Roentgenograms, and Conclusions.

While, as has been found before, the average density and contrast of roentgenograms made on paper are inferior to those on film and the former should not be used in place of the latter unless for important practical reasons, nevertheless, if a large group of employees are to be examined by

single roentgenograms, the use of paper in rolls is less expensive, quicker, and available for survey work, if the technical methods here outlined are used, with provision for pathological and doubtful cases to be referred for more thorough radiological examination.

Thirty-one of the 49 roentgenologists were of the opinion that the paper roentgenograms would be satisfactory for a preliminary survey. Certain improvements in the technical procedures with paper roentgenograms can be made. The authors believe that since the paper roentgenograms are in no way superior to those on film, it would be best in the long run to attempt to work out a scheme for making roentgenograms on film quickly and at low cost, possibly by using X-ray film in rolls. Decreasing the size of the roentgenograms would also reduce the cost.

In particular, it would be extremely useful to devise a detailed specification of all the technical factors involved in making chest roentgenograms which might be accurately followed thereafter in any laboratory.

The *Bulletin* is necessarily quite technical, and in some places not very clear in language, while considerable basic knowledge of roentgenography and photography is assumed.

EMERY R. HAYHURST

Education of the Handicapped—*By Merle E. Frampton and Hugh Grant Rowell. Vol. I, History. Yonkers-on-Hudson, N. Y.: World Book Company, 1938. 200 pp. Price, \$2.40.*

The chief virtue of this volume seems to be that it has gathered between its two covers a mass of miscellaneous information concerning the history of care for those handicapped in vision, hearing, speech, mental or social development, and for the crippled and

those "under vitalized" through tuberculosis, heart disease, or malnutrition. Such a compilation fulfils a long felt need and this volume will be welcomed by teachers and lecturers in several fields.

Certain details of the attitudes toward each of the handicapped groups, of the development of specific educational methods for each group, and of the leaders in those movements which have helped or hindered each are recorded.

The authors emphasize how much the handicapped have depended upon the development of social and humanitarian movements and how any progress in their education has *followed* rather than *led* the cultured and scientific patterns through the ages. They conclude that because of the complex nature of needs of these specialized groups this must continue to be so.

A second premise is that the history of these groups has been influenced more by great personages than by social, economic, religious, or political events and, therefore, with the exception of the socially handicapped, the general pattern of telling of the lives and influence of various figures prominent in the history of each group has been followed. This results at times in a succession of names and events in which the theme of the story seems to be only faintly heard. Would it not have been possible to tell as integrated a story for the visually handicapped, for example as Sanford Bates has written on the socially handicapped.

The volume has been edited and apparently largely written by Drs. Framton and Rowell. Distinguished contributors are listed, though credit is given only to Bates in the chapter on the socially handicapped and to Romaine Prior for the chapter on the orthopedically crippled. A bibliography of important books and magazine articles on each subject is included—

but the text itself is not documented.

For the public health worker, the volume presents a broad point of view on the subject of the handicapped; one emphasizing the need for and possibility of assisting these persons to live effectively in the world as they find it. To include the cardiacs as well as the blind in the picture is helpful. The story of the former is limited—but the discussion of open air classes is certainly pertinent. No mention is made of other medically handicapped, the asthmatics, for example.

LEONA BAUMGARTNER

Fighting for Life—By S. Josephine Baker, M.D. New York: Macmillan, 1939. 246 pp. Price, \$2.75.

This is the autobiography of one who has gloried in fighting for good causes. Dr. Baker tells of a day when she was 6 years old and all dressed up for some great occasion. She wore a "beautiful white lacy dress with a blue sash and light blue stockings and light blue shoes." As she sat on a horse block contemplating her fine appearance, a little black girl happened to come along, looking peaked and hungry and attired in rags. Thereupon Josephine took off all her own clothing, even her underclothes, and gave them to the poor colored child, returning to her home quite naked. This action Dr. Baker describes as characteristic of herself through life. She says she has always been trying to do things about hopeless situations.

Happily, most of Dr. Baker's struggles ended in victories. Her experience as a pioneer in obtaining medical training for women, and as a militant leader in the suffragist movement, and, above all, her notable career in the New York City Department of Health where she became head of the Bureau of Child Hygiene, are told with detail and zest. The names of many prominent members of the

medical profession, the stage and political life, and scenes and incidents relating to New York, particularly in the nineties and early part of the present century, adorn the pages. The keen enjoyment which seems to have been taken in writing the book is certain to be shared by readers.

It is unfortunate that this entertaining book is marred by a number of inaccuracies. Two examples will suffice.

Dr. Baker's early home was in Poughkeepsie, where she lived until she was 16 years of age. She left, following the death of her father from typhoid fever. The prevalence of the disease that winter, she says, led to the installation of the first municipal water filtration plant in the United States. The truth is that the Poughkeepsie filter was built in 1872 from designs by James P. Kirkwood. If Dr. Baker was 16 then, she must be 83 now, an imputation which she would probably resent.

The discovery of Typhoid Mary is described, but quite incorrectly. Dr. Baker was at the time an inspector in the New York City Health Department and succeeded in arresting the woman with the help of four policemen, after she had been located and her pugnacious character explained. Contrary to Dr. Baker's account the investigation which led to the arrest was not made in order to test any statement of Robert Koch's, nor was it made by anybody connected with the New York City Department of Health, nor any other health department, for that matter. Nor was the arrest made to see whether the investigator's* suspicions were justified. The case had been fully proved by him before it was brought to the attention of the city health department. The effect of Dr. Baker's statement is not only to rob the investigator of much of the credit

which properly belongs to him, but gives what seems to be authority to an erroneous account of what has long been regarded as a most important epidemiological discovery. GEORGE A. SOPER

Pulmonary Tuberculosis in Adults and Children—By James Alexander Miller, M.D., and Arvid Wallgren, M.D. New York: Nelson, 1939. 193 pp. Price, \$3.50.

The authors have republished in book form, with some modification, their articles in the *Nelson Loose-Leaf Medicine*. Both authors recognize the extreme complexity of tuberculosis and the multiplicity of factors which may determine the course of the disease. Miller classifies pulmonary tuberculosis as primary, prephthisical and phthisical. Wallgren as primary, secondary and tertiary, thus following German and French terminology rather than that commonly used in the United States. They feel that these groupings help clarify the pathogenesis of the disease and bring into proper relief the hematogenous spread of the bacilli in the body. Both are critical of the American emphasis on exogenous reinfection, since they feel it to be of minor importance, hence they do not approve of the classification of Primary Tuberculosis and Reinfection Tuberculosis adopted in the 1938 Edition of *Diagnostic Standards*, published by the National Tuberculosis Association. It is the reviewer's understanding, however, that this classification, as explained in *Diagnostic Standards*, has met with very little adverse criticism in this country. Until the reasons for the protean nature of tuberculosis are known with more certainty it is doubtful whether further refinements in classification will have value clinically.

It is natural that the authors, holding the views indicated, do not stress the protection of infected persons from contact with open cases. Indeed,

* George A. Soper (Editor).

Wallgren goes so far as to say "it is generally found that children who are tuberculin-positive do not run any risk if they are exposed to tuberculous infection." This is, of course, opposed to the view of tuberculosis specialists and public health workers in this country.

Wallgren discusses in an interesting way erythema nodosum and sero-fibrinous pleurisy, both of which appear to be more frequent in Sweden than in the United States, and writes out of wide experience of the prognostic aid of repeated sedimentation tests. He states that the demonstration of tubercle bacilli in the gastric lavage water "has no prognostic significance nor does it offer any guidance in treatment or in judging the contagiousness of the child."

Some of the reproductions of X-ray films do not show clearly the pathology indicated in the text. Few typographical errors were noted. On page 37 and again on page 58 the sentence following (3) beginning "the first intercostal spaces between the clavicles" presumably should read "below" instead of "between." At the top of page 153 column 1 "a manner of chance" should read "a matter of chance." Wallgren's rather extensive references are mostly to continental European writers.

For an interesting presentation of the pathogenesis of tuberculosis the book is to be recommended. For details of treatment, especially collapse therapy, other authors dealing comprehensively with therapy should be consulted.

JOHN H. KORN

Nutrition—By Margaret S. Chaney, Ph.D., and Margaret Ahlborn, M.S. (rev. ed.) Boston: Houghton Mifflin, 1939. 436 pp. Price, \$3.00.

This text has been substantially rewritten since the first edition, published 5 years ago, but the original form has been retained.

Nutrition deals with the health of the individual as related to food and the ability of the body to utilize food. Pre-parental education, as that given, should aid considerably in correcting bad food habits and in the promotion of an optimal state of health in the members of the family. Some mention is made of the relationship of food to certain pathological conditions in which diet is of primary importance.

There are 14 excellent chapters discussing energy metabolism, minerals, vitamins, body regulators, nutrition during the reproductive period, and optimal nutrition for infants, children, and adults. Recent developments are presented and an up-to-date bibliography is appended to each chapter. The text is supplemented by 56 fine illustrations and 85 tables. The appendix contains many excellent food value tables, height-weight charts, and other similar data. Its unique value lies in its presentation of an outline of methods for animal experimentation applicable to vitamin testing. This section includes methods for feeding and breeding stock animals; assaying for vitamins A, B₁, C, D, and riboflavin; anemia testing; and methods for the preparation of constituents of experimental diets. Detailed directions are also given for the use of the Benedict-Roth recording metabolism apparatus.

Nutrition is a well organized book whose authors have overcome some of the failings of similar texts. It deserves a place in the reference library of doctors, nurses, dieticians, and other nutritionists.

C. R. FELLERS AND A. S. LEVINE

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Telling the Public—So many of your well read lay contacts will have discovered this excellent dissertation on chemotherapy with sulfanilamide and its derivatives, that you had better prepare yourself to discuss the matter by reading the article, too. Once more *Fortune* does an outstanding job in public health education.

ANON. *Cure by Chemicals. Fortune.* 20, 3:42 (Sept.), 1939.

Health Education by Doing—In Syracuse (New York) the juniors and seniors in public and parochial high schools are offered the tuberculin test and X-ray examination if positive: about half accept the test, but all learn about tuberculosis. Four years ago a third were positive reactors; today less than a quarter. Discussants suggest that where the tuberculosis rate is low and, as in Syracuse, where community case finding is adequate, justification for school testing may depend upon cost per diagnosis.

AYLING, W. E. *The Value of Tuberculin Skin Tests in a School Program. New York State J. Med.* 39, 15:1463 (Aug. 1), 1939.

Historical Note—Some interesting historical highlights on the evolution from law enforcement to health guidance are told in a brief radio talk by one who took an active part during the whole period. Not many of us can quote what he heard Koch say to Biggs.

BOLDUAN, C. F. *Education versus Compulsion. New York State J. Med.* 39, 15:1505 (Aug. 1), 1939.

All about Colds and Related Ills—Here, you will find a good workman-like review, brief and to the point, of everything you will need to use in

telling your public about the respiratory infections and related conditions. It is a continued story and both parts should be read and saved.

CECIL, R. L. *The Control of Respiratory Infections. Preventive Medicine (New York Academy of Medicine).* 9, 3:50 (June), 1939.

Quaranto Die—Discrepancies between established facts about communicability of certain diseases and the control measures adopted by the Canadian provinces (which in many instances are not as incongruous as our own) appear to the public as evidence of blundering and inconsistency. Health departments may well experiment but there should be better international and interstate agreement in practices.

EMERSON, H. *Current Practice in Communicable Disease Control.* (and) JENKINS, R. B. *The Value of Present Control Measures in Communicable Diseases. Canad. Pub. Health J.* 30, 7:325 (July), 1939.

Putting the Bacterium in His Place—Useful definitions of some badly abused words—disinfection, sterilization, bacteriostasis—introduce a discussion of practical disinfection methods available for the public health nurse working under the handicaps of the usual home. It's to be continued.

FROBISHER, M. *Disinfection in the Home. Am. J. Nurs.* 39, 8:833 (Aug.), 1939.

Some Slips Twixt Cup and Lip—The time has come, the author says, for health and water works officials to give more consideration to what happens to the water in public systems en route to the consumer in order to minimize health hazards that now exist. What these hazards are and

what to do about them are the subjects of the useful paper.

GORMAN, A. E. Potential Health Hazards in Distribution of Water. *J. Am. Water Works A.* 31, 7:1143 (July), 1939.

Limitless Possibilities of Isotypes

—Some information about Neurath's methods that all health educators, in name or in fact, will want to store away for future use.

KAEMPFERT, W. Facts March On—with Neurath. *Survey Graphic.* 28, 9:538 (Sept.), 1939.

Just as One Would Assume—

Nutritionists will appreciate this exact study, the findings of which are that bone development in the wrist is related to the diet of the child. Youngsters on an institutional diet supplemented with reconstituted evaporated milk or with cod liver oil made better bone growth than those who received no supplements.

MACNAIR, V. Effect of a Dietary Supplement on Ossification of the Bones of the Wrist in Institutional Children. *Am. J. Dis. Child.* 58, 2:295 (Aug.), 1939.

Cancer Statistics—This is a significant finding: cancer of the digestive tract which causes about half the male deaths and a third of the female deaths from cancer, makes up only a quarter of all lesions in living cases. In the case of cancer of the breast and uterus the rates are about the same in living and fatal cases. Cancer of the skin and lip are the most frequent sites among males, whereas cancer of the breast and genital tract are most common among females.

MOUNTIN, J. W., *et al.* The Incidence of Cancer in Atlanta, Ga., and Surrounding Counties. *Pub. Health Rep.* 54, 28:1255 (July 14), 1939.

Has Today's Tuberculous Patient a Better Chance?—Some pretty gloomy statistics about the success of tuberculosis treatment have been pub-

lished recently and annotated in these pages. Now we can report something on the brighter side. The fatality rate has been steadily reduced at Trudeau Sanatorium, and early diagnosis by means of the roentgenogram has played an important part in the decline.

SAMPSON, H. L. Fatality Rates in Pulmonary Tuberculosis. *Am. Rev. Tuberc.* 40, 1:71 (July), 1939.

Let Us Flee Said the Fly, etc.—

Here is something you probably do not know: most insecticides used for spraying rooms are toxic and irritating to the skin in sufficient concentration. Both the petroleum distillate and the active principle usually are irritating but no notice to this effect is given. Users should be warned and the directions should urge the use of protective clothing, the exposure of the skin as little as possible, and that containers be kept away from children.

SCHWARTZ, L., and WARREN, L. H. Dermatitis Caused by a New Insecticide. *Pub. Health Rep.* 54, 31:1426 (Aug. 4), 1939.

Overweight and High Blood

Pressure—In a large group of physical examinees, especially among those from 50 to 59, overweight was found to increase the incidence of hypertension. The incidence, however, was not as great as some other observers have reported.

SHORT, J. J., and JOHNSON, H. J. An Evaluation of the Influence of Overweight on Blood Pressures of Healthy Men. *Am. J. M. Sc.* 198, 2:220 (Aug.), 1939.

Health Officers and Medical Care

—If the public provision of adequate medical care is to come, as this author believes it will, then the established health departments should administer it. If the decade following 1940 is to be a period of accomplishment as the 30's were of discussion, then public health had better set its house in order.

SINAI, N. The Present Situation Regarding the Adequacy of Medical Care in the

United States. Canad. Pub. Health J. 30, 7:319 (July), 1939.

Among Our Blessings—At least one worry that is not likely soon to plague American sanitarians is given a

thorough airing for the benefit of our British brethren. The title tells the story sufficiently for our purposes.

WILLIAMSON, A. B. *The Problem of the Disposal of the Dead after Air Raids.* Pub. Health. 52, 11:329 (Aug.), 1939.

BOOKS RECEIVED

TEXT-BOOK OF MEAT HYGIENE. By Richard Edelmänn. 7th ed. rev. by John R. Mohler and Adolph Eichhorn. Philadelphia: Lea & Febiger, 1939. 463 pp. Price, \$5.50.

TEXTBOOK OF MICROBIOLOGY. By Kenneth L. Burdon. 2d ed. of A TEXTBOOK OF BACTERIOLOGY. New York: Macmillan, 1939. 638 pp. Price, \$2.75.

ELEMENTS OF STATISTICAL REASONING. By Alan E. Treloar. New York: Wiley, 1939. 261 pp. Price, \$3.25.

BRUCELLOSIS IN MAN AND ANIMALS. By I. Forest Huddleson. New York: Commonwealth, 1939. 339 pp. Price, \$3.50.

HANDBOOK OF CHEMISTRY. By Norbert Adolph Lange. 3d ed. rev. Sandusky: Handbook Publisher, 1939. 1543 pp. Price, \$6.00.

BACTERIAL METABOLISM. By Marjory Stephenson. New edition. New York:

Longmans, 1939. 391 pp. Price, \$7.50.

THE STORY OF SURGERY. By Harvey Graham. New York: Doubleday, 1939. 425 pp. Price, \$3.75.

THE BUILDING OF A NATION'S HEALTH. By Sir George Newman. New York: Macmillan, 1939. 479 pp. Price, \$6.00.

CHILD TRAINING AND PARENT EDUCATION. References to Material in Recent Books. By Lucile Reiner Stebbing and Caroline Shurtleff Hughes. 2d ed. rev. New York: Wilson, 1939. 83 pp. Price, \$.90.

PUBLIC HEALTH IN SOUTH AFRICA. By E. H. Cluver. 2d ed. Johannesburg: Central News Agency. 1939. 342 pp. Price, \$4.00.

PUBLIC WATER SUPPLIES IN VIRGINIA. Descriptions and Chemical Analyses. Richmond: State Department of Health, 1939. 159 pp.

ASSOCIATION NEWS

SIXTY-EIGHTH ANNUAL MEETING

Pittsburgh, Pa., October 17-20, 1939

HEADQUARTERS — HOTEL WILLIAM PENN

CALENDAR OF THE 68TH ANNUAL MEETING

Sunday, October 15

- 9:00 A.M. Registration begins (Ball Room, William Penn Hotel).
- 9:30 A.M. Collegiate Council on Public Health Nursing—National Organization for Public Health Nursing.
- 10:00 A.M. Sixth Institute on Public Health Education opens.
- 2:30 P.M. Health Education Institute.
Collegiate Council on Public Health Nursing—National Organization for Public Health Nursing.
- 8:30 P.M. Community Mass Meeting—American Social Hygiene Association.

Monday, October 16

- 9:30 A.M. Pittsburgh Breakfast—under the auspices of the Women's Entertainment Committee. Everybody invited.
- Association of Women in Public Health.
- Conference of Municipal Public Health Engineers.
- Conference of State Laboratory Directors.
- Conference of State Sanitary Engineers.
- International Society of Medical Health Officers.
- Health Education Institute.
- State Directors of Public Health Nursing.
- Education Committee—National Organization for Public Health Nursing.

Luncheons.

- Association of Women in Public Health.
- International Society of Medical Health Officers and Health Education Institute.

- 2:30 P.M. American School Health Association.

Conference of Municipal Public Health Engineers.

Conference of State Laboratory Directors.

Conference of State Sanitary Engineers.

International Society of Medical Health Officers.

Education Committee—National Organization for Public Health Nursing.

State Directors of Public Health Nursing.

Health Education Institute.

- 4:00 P.M. Conference of Directors of Local Health Service.

- 4:30 P.M. Tea—Association of Women in Public Health.

Dinners. International Society of Medical Health Officers.

National Organization for Public Health Nursing.

Tuesday, October 17

- 9:15 A.M. Health Education Institute.
Section Meetings.
- 2:30 P.M. Section Meetings.
- 8:30 P.M. Opening General Session.

Wednesday, October 18

- 9:15 A.M. Section Meetings.
- 11:45 A.M. General Session—Professional Education.
- 2:30 P.M. Section Meetings.
General Session—Medical Care.
Conference on Health Museums.
- 6:30 P.M. Pennsylvania Public Health Association and Tri-State Food and Health Officials Dinner.
- 8:30 P.M. Public Meeting.

Thursday, October 19

- 9:15 A.M. Section Meetings.
- 11:45 A.M. General Session—Cancer.
- 2:00 P.M. Sight-seeing Trip.
- 7:00 P.M. Annual Banquet.

Friday, October 20

- 9:15 A.M. Section Meetings.
- 2:30 P.M. Section Meetings.
- 5:00 P.M. Adjournment.
- Late Evening. Departure of special trains for New York for delegates attending the New York World's Fair.

Saturday, October 21

NATIONAL HEALTH DAY at the New York World's Fair.

The abbreviated calendar above omits breakfast, luncheon and dinner sessions of sections, committees, and special groups. It also omits mention of many conferences of interest to limited numbers of delegates. No reference is made to the important and varied inspection trips. The final program, obtainable at the Registration Desk in the Ball Room of the William Penn Hotel, will convey full information about all these things.

Hotel and railroad rates have been published in the *Journal* as have also the summary of the scientific sessions and descriptions of places of public health interest in Pittsburgh which delegates will visit. Consult the July, August, and September issues. Come to Pittsburgh for the 68th Annual Meeting of your Association and meetings of related organizations.

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

- George W. Bassow, M.D., Main St., Woodstock, N. Y., Health Officer
- Edwin H. Federman, M.D., Court House Annex, Eau Claire, Wis., City-County Health Officer
- German Figueroa, M.D., C.P.H., Ayacucho 166, Barquisimeto, Venezuela, S. A., Health Officer
- Erwin F. Hoffman, M.D., M.S.P.H., 805 Vulcan St., Iron Mountain, Mich., Director, Dickinson County Health Dept.
- Joseph A. Johnson, M.D., Box 58, Greensboro, Ga., Commissioner of Health, Greene County Health Dept.
- Raymond Luft, M.D., 1915 Elmwood Ave., Norwood, R. I., Superintendent of Health, City of Warwick
- Harcourt A. Morgan, Jr., M.D., Athens, Tenn., Director, McMinn County Health Unit
- Charles F. Nassau, M.D., LL.D., Sc.D., 503 City Hall Annex, Philadelphia, Pa., Director, Dept. of Health
- Frederick P. Perkins, M.D., Capitol Annex, Room 103, Phoenix, Ariz., Superintendent of Public Health of Arizona
- James E. Peterman, M.D., 624 Church St., Indiana, Pa., District Medical Health Officer
- L. L. Sanford, M.D., University of Wyoming, Laramie, Wyo., Director of Student Health and University Physician

Maurice D. Vest, M.D., M.P.H., 619 Carson Ave., La Junta, Colo., Health Officer, Otero County Health Unit

Laboratory Section

- F. W. Janssen, 109 Grand St., Hoboken, N. J., Director of Laboratories, Janssen Dairy Corp.
- Dr. Francesco N. Piccaluga, Blandengues 4350, Buenos Aires, Argentine, S. A., Director, Instituto Massone
- Fries Shaffner, B.S. in Ed., 486 Avalon Rd., Winston-Salem, N. C., Serologist, Forsyth County Health Dept.
- Jennie S. Siemienski, B.A., M.T., 10036 Jos. Campau, Hamtramck, Mich., Medical Technologist, Dept. of Health

Public Health Engineering Section

- Melvin A. Dobbs, B.S. in C.E., 325 East Broadway, East St. Louis, Ill., Sanitary Engineer, East Side Health District
- Curtis B. Williams, B.S., State Dept. of Public Health, Santa Fe, N. Mex., State Milk Sanitarian

Child Hygiene Section

- Evelyn F. Buchheim, M.D., 682 Jean St., Oakland, Calif., Pediatrician, Bureau of Child Hygiene, State Health Dept.
- Grace L. Dowell, R.N., 111 N. 3rd St., Arkansas City, Kans., Health Supervisor, Public Schools
- Anita E. Faverman, M.D., 1838 Anza St.,

San Francisco, Calif., Pediatrician, State Health Dept.

Melvin J. H. Tess, M.D., 14th and Market Sts., Municipal Courts Bldg., St. Louis, Mo., Supervisor, Parochial School Health Program, Health Dept.

Industrial Hygiene Section

Marion F. Trice, B.S., 2004 Stone St., Raleigh, N. C., Industrial Hygienist, State Board of Health

Food and Nutrition Section

William V. Cruess, Ph.D., 339 Hilgard Hall, University of California, Berkeley, Calif., Assistant Professor in Food Technology

Public Health Education Section

Eleanore Aldworth, M.A., 2116 Devonshire Road, Ann Arbor, Mich., Hygiene Instructor, State Teachers College

Eva M. Bourne, R.N., 200 N. Michigan St., Roswell, N. Mex., City School Nurse

Paul Dodds, M.D., Room 510, South Office Bldg., State Capitol, Harrisburg, Pa., Director, Bureau of Maternal and Child Health, State Health Dept.

Donald A. Dukelow, M.D., 3744 46th Ave. S., Minneapolis, Minn., Director of Public Health Education, State Health Dept.

Alice L. Edwards, A.B., 306 State Bldg., Civic Center, San Francisco, Calif., Public Information Editor, State Health Dept.

Elizabeth C. Hoover, M.D., 1432 Potomac Ave., Dormont, Pa., Physician, Board of Health

Florence C. Kahn, D.H., 306 State Bldg., San Francisco, Calif., Dental Hygienist, State Health Dept.

Eloise Kloss, B.A., City Health Dept., Louisville, Ky., Director of Health Education

Meyer J. Plishner, B.S., M.P.H., Mill and Passaic Sts., Paterson, N. J., Public Relations Secretary, Passaic County Tuberculosis and Health Assn.

Ruth F. Rogers, B.A., Michigan Dept. of Health, Lansing, Mich., Consultant in Dental Health

Margaret M. Twombly, A.M., 1681 Shasta Ave., San Jose, Calif., Acting Head, Dept. of Health and Hygiene, San Jose State College

Public Health Nursing Section

Anna R. Ballo, 616 S. Third St., Raton, N. Mex., Colfax County Health Nurse

Jefferson I. Brown, R.N., State Board of Health, Phoenix, Ariz., Chief Nursing Consultant

Verna E. Hancock, Argonaut Hotel, Denver, Colo., General Field Supervisor, State Health Dept.

Winifred Humber, R.N., B.S., P. O. Box 233, Lone Pine, Calif., Public Health Nurse, Division of Child Hygiene, State Health Dept.

Sister Minalia, B.S. in Ed., R.N., St. Elizabeth Hospital, 49 Hopeland St., Dayton, Ohio, Director of Nurses

Marjorie J. D. McLean, 112 Riverside Ave., Decorah, Iowa, School Nurse, Board of Education

Catherine A. Sullivan, R.N., 318 S. 4th St., Steubenville, Ohio, City Health Nurse

Bessie Tattershall, R.N., 69 Main St., Tuckahoe, N. Y., Staff Nurse, Public Health Nursing Organization of Eastchester

Helen M. Wolfe, 305 State Bldg., San Francisco, Calif., Consultant in Orthopedic Nursing, State Health Dept.

Frances H. Ziegler, B.S., R.N., Vanderbilt University, Nashville, Tenn., Dean, School of Nursing

Epidemiology Section

John A. Carswell, M.D., D.P.H., P. O. Box 2658, Juneau, Alaska, Epidemiologist, Dept. of Health

Richard J. Kettering, City Health Office, Aberdeen, S. D., Milk Sanitarian

Charles H. Mann, Jr., M.D., M.S.P.H., 301 N. Erie St., Bay City, Mich., Assistant, Division of Hygiene and Public Health, University of Michigan

James M. Mather, M.D., D.P.H., 19 Grand St., Coldwater, Mich., Assistant to Branch County Health Director

Unaffiliated

R. H. Lucas, 925 Main St., Columbia, S. C., Accountant, State Board of Health

Frances A. Macdonald, A.B., 236 Bay State Road, Boston, Mass., Junior Epidemiologist, State Dept. of Health

Cyrus H. Maxwell, M.D., 3 Winding Road, Elmsmere, N. Y., Chief, Health Service Bureau, State Education Dept.

Charles E. McBrayer, M.D. (Lieut. Col. U.S.A., Retired), Hotel Multnomah, Portland, Ore.

Galina Mouromseff, B.A., 219 Montclair Ave., Montclair, N. J., Research Dept., Westinghouse Electric and Manufacturing Co.

Lucy V. Reardon, M.A., National Institute of Health, Washington, D. C., Associate Protozoölogist

APPLICANTS FOR FELLOWSHIP

(Additional to names published in August and September *Journals*)

In accordance with the By-laws of the Association, the names of applicants for Fellowship are officially published herewith. They have requested affiliation with the Sections indicated. Action by the various Section Councils, the Committee on Eligibility, and the Governing Council will take place between now and the time of the Pittsburgh Annual Meeting.

Health Officers Section

- William H. Best, M.D., Deputy Commissioner,
New York City Dept. of Health, New
York, N. Y.
Regnar M. Sorenson, M.D., C.P.H., Director,
Division of Venereal Disease Control, State
Dept. of Health, Des Moines, Iowa
Maysil M. Williams, M.D., C.P.H., State
Health Officer, Bismarck, N. D.

Laboratory Section

- N. Paul Hudson, M.D., Ph.D., Professor and
Chairman, Dept. of Bacteriology, Ohio
State University, Columbus, Ohio
Murrell O. Robinson, V.M.D., Professor of
Bacteriology, Alabama Polytechnic Insti-
tute, Auburn, Ala.
Fred D. Stimpert, Ph.D., Medical Micro-
biologist, Los Angeles County Hospital,
Los Angeles, Calif.

Public Health Engineering Section

- Milton H. Bidwell, B.S., Bacteriologist, New
York State Conservation Dept., Oceanside,
L. I., N. Y.
Francis M. Dawson, M.C.E., Dean, College
of Engineering, University of Iowa, Iowa
City, Iowa

Industrial Hygiene Section

- Edward G. Meiter, Ph.D., Director, Indus-
trial Hygiene Laboratory, Employers Mut-
tual Liability Insurance Co., Milwaukee,
Wis.

Food and Nutrition Section

- Frederic W. Nordsiek, S.B., Associate, Dept.
of Nutrition, American Institute of Baking,
New York, N. Y.

Child Hygiene Section

- Francis V. Corrigan, M.D., Chief, Division
of Maternal and Child Health, State Dept.
of Health, Providence, R. I.

Public Health Education Section

- Harold S. Diehl, M.D., Sc.D., Dean of Med-
ical Sciences, University of Minnesota,
Minneapolis, Minn.

Bess Exton, M.A., C.P.H., Assistant Health
Educator, National Education Assoc.,
Washington, D. C.

D. Clare Gates, Dr.P.H., M.S.P.H., Director
of Health Education, State Dept. of Health,
Bismarck, N. D.

Ruth E. Grout, C.P.H., Ph.D., Senior Super-
visor of Health Education, Dept. of
Health and Safety, Tennessee Valley
Authority, Chattanooga, Tenn.

Leo H. Mynes, M.D., Medical Director,
Kanawha County School Health Service,
Charleston, W. Va.

Delbert Oberteuffer, Ph.D., Professor of
Physical Education and Chairman, Division
for Men, Ohio State University, Columbus,
Ohio

Anna B. Towse, B.S., Executive Secretary,
Good Teeth Council for Children, Inc.,
Chicago, Ill.

Margaret H. Tracy, A.B., Executive Secre-
tary, Boston Health League, Boston, Mass.

David B. Treat, A.M., Director of Public
Health Education, Dept. of Public Health,
Flint, Mich.

Kathleen W. Wootten, M.A., Head, Health
Dept., Georgia State College for Women,
Milledgeville, Ga.

Epidemiology Section

Harold W. Brown, M.D., Dr.P.H., Professor
of Public Health, University of North
Carolina, Chapel Hill, N. C.

Bernard M. Blum, M.D., M.P.H., Assistant
District State Health Officer, State Dept.
of Health, Buffalo, N. Y.

Unaffiliated

Robert P. Fischelis, Phar.D., B.Sc., Secretary
and Chief Chemist, Board of Pharmacy of
the State of New Jersey, Trenton, N. J.

Marie C. Harrington, M.A., Educational
Director, Dairy Council of St. Louis, St.
Louis, Mo.

Bruce H. Pollock, M.D., C.P.H., District
Health Officer, State Dept. of Health, Point
Pleasant, W. Va.

THE WESTERN BRANCH REPORTS ON TEN YEARS OF PROGRESS

FROM the Western Branch of the A.P.H.A. comes an interesting and illuminating report of ten years of progress as recorded by Dr. William P. Shepard who retired as Secretary of the Western Branch at its Oakland meeting in July. Dr. Shepard pays tribute for remarkable progress to the vigorous and courageous national leadership in the Public Health Service, and to the principles for which the American Public Health Association and the Western Branch have always stood, namely, an abiding faith in the importance and values of the public health cause and a willingness to work together for public health advancement regardless of personal glory.

The Western Branch has reached its Tenth Annual Meeting with a membership of 1,437. Of this number 127 are Fellows and 871 active members of the A.P.H.A., and 439 are regional members. In 10 years the A.P.H.A. membership in the Western Branch has increased from 368 to 998—an increase of over 170 per cent! It is interesting to note also that the A.P.H.A. constituency in the Western Branch represents 15 per cent of the total A.P.H.A. membership. Since the last Branch meeting there has been a gain of 197 members, and not one state, province, or territory shows a loss in membership.

In 1929 when the Branch was organized, only 34 counties in its territory had full-time units. Today there are 64 counties with full-time health units and 75 more counties served by full-time health districts—a total of 139. Similarly, in 1929 there were 220 full-time employees engaged in health service in 32 counties (excluding Los Angeles and San Francisco). This year there are 825 full-time and 46 part-time public health workers engaged in the 137 counties. Ten years

ago there were 293 full-time employees in the 11 state health departments comprising Western Branch territory. This year there are 513, an increase of 220 or 75 per cent. Combining state and county full-time personnel, there were 513 in 1929, and in 1939 there are 1,338, an increase of 825 or 161 per cent. Unfortunately figures for the Provinces of Canada, the cities and Territories of the Western Branch are not available but there can be no doubt that here too the story would be as encouraging.

The influence of western public health workers in the affairs of the parent body is evidenced by the fact that today Western Branch members hold 53 A.P.H.A. offices or committee memberships. In 1930, at the time of the First Annual Meeting there were 30 such incumbents. The interest of Western Branch members in national health affairs is further evidenced by the yearly increase in their attendance at A.P.H.A. Annual Meetings.

When the Western Branch was organized, there was one Western state public health society affiliated with the A.P.H.A. Today there are 6 with an application pending from one state and another expected shortly.

Canadian members of the A.P.H.A. have been most enthusiastic in their support of the Western Branch and faithful in their attendance at its meetings. The Canadian membership has increased from 7 to 31.

The only two remaining Territories of the United States are included in the Western Branch. Through the efforts of the late Dr. F. E. Trotter, the membership in Hawaii has increased from 0 to 31. Dr. W. W. Council of Alaska is responsible for the increase in Alaska from 0 to 22.

Direct public health activities of the

Western Branch are a matter of record. They loom large when the scientific papers presented at annual meetings, the minutes, committee reports, and resolutions are surveyed. Among them are:

Early recognition of the health hazards connected with the construction of Boulder Dam and recommendation to the proper persons that these be given careful study. The health record of this enormous undertaking was surprisingly good, and the importance of preventive medicine in industry was once more demonstrated.

Repeated pleas for national assistance with the health problems of migratory workers, especially with tuberculosis. Only in recent years have these pleas been heeded.

Recognizing the value and helping to stabilize research in the control of Rocky Mountain Spotted Fever. Attention has been directed to the general prevalence of the disease, its eastward spread, and the necessity of ample supplies of vaccine. The Laboratory at Hamilton, Mont., has been assumed by the U. S. Public Health Service, additional buildings provided, and the staff increased.

Attention of state and national legislators has been repeatedly called to the importance of maintaining adequate funds for health protection and for providing trained personnel.

Urging the establishment of a western training school for public health personnel. Three years ago such a school was established at the University of California. Nearly 50 health officers have been trained as well as over 100 other individuals.

Public recognition in 1935 of the fact that plague infection was widespread among various rodents of the West. Immediate and intensive study was called for. The term "Sylvatic Plague" was introduced by Dr. Karl F. Meyer to distinguish this endemic wild rodent disease from epidemics of plague customarily associated with domestic rodents and man. Annual reports have been made and published since.

Appointment of a committee to promulgate and encourage newer methods of diagnosis and treatment of lobar pneumonia.

Equally interesting and important activities have been the discovery of "Valley Fever" and its relation to coccidioidal granuloma, and control of botulism and mussel poisoning. There are others too numerous to mention.

The original object of the Western Branch as stated in its Constitution is "to protect and promote public and personal health, and to promote better health service in the Western portions of the United States and the Dominion of Canada." In the 11 years of its existence the Western Branch has demonstrated its usefulness and the worthiness of this original object. The Western Branch has had virtually no money except a modest sum for limited mailing and printing from the parent organization. It has had no full-time personnel. Its work has been done by voluntary officers and committees.

The experiences recorded here have contributed to the success of this unique organization. They are made part of the record in order that they may not be lost sight of in the future.

CHARLES H. HOOD EDUCATIONAL TRUST

THE Charles H. Hood Educational Trust of Boston has made a grant of \$6,000 for the work of the American Public Health Association's Committee on Coördination in Health Education (Joint Committee between the Health Officers and Public Health Education Sections). Professor C. E. Turner of the Massachusetts Institute of Technology is Chairman.

The grant will be administered through the Health Education Research Laboratory at the Massachusetts Institute of Technology.

NEWS FROM THE SOUTHERN BRANCH

THE Southern Branch of the American Public Health Association will meet in Memphis, Tenn., during the annual sessions of the Southern Medical Association, November 21-24. The Branch meetings will be held on Tuesday and Wednesday, November 21-22.

Dr. P. E. Blackerby, Assistant State Health Commissioner of Kentucky, who is Secretary of the Southern Branch, has announced that with the approval of President J. N. Baker there have been made the following changes in the Governing Council and the Regional Executive Board of the Branch. Dr. James A. Hayne, Columbia, S. C., succeeds Dr. J. N. Baker as a member of the Regional Executive Board; and Dr. Felix J. Underwood, Jackson, Miss., is reappointed as a member of this Board. The following persons are also appointed to the

Governing Council of the Southern Branch: Dr. Warren F. Draper, District of Columbia; Dr. H. F. Parker, Jefferson City, Mo.; Dr. W. C. Williams, Nashville, Tenn., and Dr. I. C. Riggins, Richmond, Va.

SUBSCRIPTION AGENT IMPOSTER

IT has been reported that a WILLIAM DALTON has been offering cut rate prices in Texas on subscriptions to the *American Journal of Public Health*, *The Trained Nurse and Hospital Review*, *Modern Hospital*, and other publications. It is stated that he has collected money, giving receipts bearing the name "National Circulation Co., Inc., 343 N. Michigan Blvd., Chicago, Ill." Efforts to reach the National Circulation Company at this address have failed.

Members of the Association are again warned that no solicitors are employed by the *American Journal of Public Health*. Subscriptions should be placed direct with the Association office or through established subscription agencies.

DECEASED MEMBERS

- Ernest C. Dickson, M.D., San Francisco, Calif., Elected Member 1920, Elected Fellow 1934
- Lucius W. Holloman, M.D., Marksville, La., Elected Member 1936
- Lloyd A. Masterson, M.D., New Orleans, La., Elected Member 1936
- Wilbur A. McPhaul, M.D., Jacksonville, Fla., Elected Member 1936
- F. E. Trotter, M.D., Honolulu, Hawaii, Elected Member 1924

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge.

Replies to these advertisements, when keyed, should be addressed to the American Public Health Association, 50 West 50th Street, New York, N. Y., identifying clearly the key number on the envelope.

POSITIONS WANTED

HEALTH OFFICERS

Experienced physician, administrator, epidemiologist and teacher, now employed, with C.P.H. from Johns Hopkins, and 14 years' public health background, will consider position. Prefers epidemiology in city or state department. Excellent references. **A355**

Experienced physician who has been local health officer and school physician in New York State, now has M.P.H. from Harvard School of Public Health, and wishes position in administration, epidemiology, or public medical service. **A423**

Physician, M.D., Yale; M.S. in field of public health, Columbia; also short course for health officers, Vanderbilt; good clinical background, 14 months' public health experience; will consider appointment in child health, epidemiology, or public health administration. **A350**

Physician, M.D., University of Cincinnati; with postgraduate training in venereal disease control, Johns Hopkins; is available as venereal disease control officer. **A363**

Physician, experienced in health administration of cities and states, will consider attractive opening in maternal and child health or health education. **A343**

Physician, M.D., Vanderbilt University; Dr.P.H., Johns Hopkins; experienced as epidemiologist, health officer and professor of preventive medicine, seeks position as administrator or epidemiologist. **A397**

Physician, M.P.H., Harvard; well experienced in city and rural health administration, will consider appointment as district health officer or in city or state health department. **A418**

Well qualified physician, M.D., Rush; M.S.P.H., University of Michigan; with 3 years' residence in tuberculosis, and special interest in venereal disease control, seeks responsible appointment. Excellent references. **A406**

Physician, M.D., University of Cincinnati; M.P.H., Harvard; postgraduate studies in bacteriology and immunology. will consider position as health officer or epidemiologist. Has served as director of county health unit, director of industrial hygiene and medical statistics and venereal disease field survey officer. **A305**

Physician, aged 33; M.D., Minnesota; Dr.P.H., Johns Hopkins; has served as epidemiologist in large city and director of county health unit, with 7 years' public health experience; will consider position in public health administration or epidemiology. **A432**

Physician, M.D., Class A medical school; completed short course for health officers at Vanderbilt; experienced health officer and director of county health unit, will consider appointment as health officer or school physician. **A320**

Physician, M.D., Columbia; experienced as county health officer and superintendent of health, seeks position in public health administration or medical executive work. **A396**

Physician, M.D., Johns Hopkins; M.S.P.H., University of Michigan; experienced in school and city health work; for the past year director of county health department, seeks position as health director of city school system or in health service of a college or university. Will also consider position as epidemiologist or health officer in urban health department. **A354**

HEALTH EDUCATION

Young woman, experienced teacher in health education, with M.S. in Public Health and Hygiene from University of Michigan, seeks position as health coördinator. **H398**

Well qualified woman in health education wishes position as health coördinator or health counselor. Has wide experience, and Ph.D. from New York University. **H236**

Young woman, Ph.D., Columbia Uni-

versity, splendid background of experience in health education, will consider position as director of public health education. H294

Young woman, M.A., Health Education, Teachers College, Columbia; with splendid international experience, seeks position as director of health education. H369

Young man, M.S.P.H., University of Michigan, experienced in an eastern state department of health and as a university instructor, desires position in popular health instruction, especially by written media, with official or volunteer health agency or with commercial enterprise, insurance company or editorial work. H435

LABORATORY

Capable research worker, Ph.D., trained at University of Southern California and Pasteur Institute, seeks position directing laboratory, in research work or field investigation. Has taught bacteriology, directed state hygiene laboratory and hospital laboratories. L315

Broadly experienced laboratory director with excellent background, now employed southern state, seeks responsible position in laboratory work or teaching of bacteriology, immunology, or pathology. L426

Physician, C.P.H., Harvard-Technology; experienced as bacteriologist and pathologist and director of state laboratories, desires position. L208

Bacteriologist, M.S.P.H., University of Michigan; 2½ years as serologist in private hospital; desires work as serologist or bacteriologist in public health laboratory. Willing to start modestly. L425

Woman bacteriologist; B.A., Chemistry, 1933, 5 years' experience in experimental and practical therapeutics including animal work; desires position in public health field. L394

Young man bacteriologist, aged 33, with training in serology; for the past 4 years bacteriologist in charge, public health laboratory; will consider opening. L427

Chemist and bacteriologist experienced in water supply, sewage, and public health laboratory work. Five years' experience. B.S., 1933. Desires work in sanitation or general public health. L412

Chemist and bacteriologist, university graduate, M.A. and M.S., with 15 years'

experience in different phases of public health work, desires position. L438

Experienced woman bacteriologist, Ph.D., University of Illinois, 1937, wishes position in teaching or research. Excellent bibliography and references. L410

Young woman, registered medical technologist with 10 years' experience, specializing in the isolation of typhoid carriers, also trained and experienced in medical social work, desires position in public health laboratory. Prefers South. L438

MISCELLANEOUS

Physician, M.D., class A medical school; training in obstetrics and public health. Experienced as director of county health department, teacher of clinical obstetrics and administrator of state maternal and child health program, desires position in public health obstetrics or in maternal and child health administration. C417

Dentist, graduate of Temple University, with excellent postgraduate experience, desires position in administrative aspects of dental hygiene. M352

Experienced teacher in bacteriology and public health; Ph.D., Cornell; now professor in grade A medical school, will consider teaching, executive or administrative position. M327

Engineer with good training and experience in water treatment, sewage plant operation and in research, wishes position as superintendent. Can go anywhere. E422

Experienced director of milk control, food and sanitation and industrial hygiene. B.S. degree and well known record directing such work in two major cities and one state. References prominent public health personalities. I434

Engineer, sanitary inspector, lecturer, long experience in large city department of health, will undertake a new assignment in above fields or in administration. Warm climate preferred. M436

Physician, 32, married, M.D., 1936; postgraduate course in v.d. control, experienced as district health officer and in organizing and publicizing syphilis control campaign; now employed in charge venereal disease clinics in metropolitan health department; seeks v.d. control post with emphasis on organizational, investigative-survey or administration. M437

Situations Open

PUBLIC HEALTH PHYSICIAN—Young physician with good medical background, interested in obtaining public health training; salaried appointment at end of month in field; man of English, Irish or Scotch ancestry preferred. 100-PH, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH PHYSICIAN—To be sponsored jointly by state department of health, Protestant mission; rural district; woman physician considered; \$2,700; South. 101-PH, Medical Bureau, Palmolive Building, Chicago.

STUDENT HEALTH PHYSICIANS—(a) Exclusive junior college for women; man or woman with Master's or Ph.D. degree, primarily trained internal medicine. (b) Co-educational college; man under 40 required; \$250 monthly, 11 months; Illinois. (c) Eastern university; recent graduate eligible; September-June; \$150. 102-PH, Medical Bureau, Palmolive Building, Chicago.

SCHOOL PHYSICIAN—Recent graduate contemplating public school health service as life work; duties include some teaching and dispensary service for students; eastern university; \$200. 103-PH, Medical Bureau, Palmolive Building, Chicago.

INDUSTRIAL NURSE—Registered nurse capable assuming complete charge industrial first-aid

station; southwest; \$150, maintenance. 104-PH, Medical Bureau, Palmolive Building, Chicago.

STUDENT HEALTH NURSE—Graduate nurse, trained public health work, for student health staff state normal school; 105-PH, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—Graduate nurse with both public health and tuberculosis experience; busy tuberculosis follow-up service, city of 40,000; \$115, increasing, plus car allowance; North. 106-PH, Medical Bureau, Palmolive Building, Chicago.

STUDENT HEALTH NURSE—Duties largely general duty in infirmary exclusive college for women; 2 years' college training required; \$100, meals. 107-PH, Medical Bureau, Palmolive Building, Chicago.

ASSISTANT SCHOOL NURSE—Public school system, city of 10,000; graduate nurse trained for public health certificate required; \$1,100, nine months; midwest. 108-PH, Medical Bureau, Palmolive Building, Chicago.

LABORATORY TECHNICIAN—Preferably one with public health laboratory experience; should be exceptionally trained bacteriology and serology; excellent future for right person. 109-PH, Medical Bureau, Palmolive Building, Chicago.

Situations Wanted

PUBLIC HEALTH PHYSICIAN—A.B., mid-western college; M.D., Johns Hopkins; M.S.P.H., University of Michigan; interesting record of successful experience including long term as school physician in fashionable suburb; for further information, please write M. Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

BACTERIOLOGIST — B.A., eastern school; C.P.H. and Ph.D. (bacteriology), Yale University; has done considerable research; 4 years, bacteriologist and research technician, public health laboratories; desires appointment in public health laboratories; for further details please write M. Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

HEALTH EDUCATOR—A.B., Wellesley; M.S. in public health from state university; 6 years, teaching physiology and sciences in public schools; 2 years, director of child health education, national organization; 2 years, health counselor and teacher of health education, midwest metropolis; 4 years' social work; for further details, please write M. Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—Graduate of a fairly large training school of nursing; graduate training in public health nursing at the University of Minnesota; 10 years' experience as public school nurse; for further details, please write M. Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

NEWS FROM THE FIELD

1939 EDITION OF CONNECTICUT OFFICIAL MILK SEDIMENT STANDARDS

THE State Dairy and Food Commissioner and the State Commissioner of Health have approved the new 1939 Edition of the Connecticut Official Milk Sediment Standards. This standard is the only one acceptable and approved for use in laboratories making milk tests in Connecticut, and to obtain better uniformity of grading milk sediment it is urged it be used for sediment testing done in the field and at milk plants. The new standard has been specially adapted to field and plant use.

In the new edition the seldom used "Excessively Dirty" discs have been eliminated and the standard carries only three sediment discs which grade milk into four cleanliness ratings; namely, Clean, Good, Poor, and Dirty. The amounts of sediment on the pads of the new standard correspond roughly with sediment scores of 13, 50, and 100 on the 1931 Edition.

Public health laboratories in Connecticut approved for the examination of milk have been requested by the State Commissioner of Health to begin use of the 1939 Edition as soon as possible and instructed to have it in use not later than December 31, 1939. Notification has been sent out that the 1931 Edition should not be used after December 31, 1939.

For many years the Connecticut Official Milk Standard has been used extensively outside of Connecticut for the grading of milk both in the United States and in other countries. In *Standard Methods for the Examination of Dairy Products*, Seventh Edition, 1939, reference is made to photographic standards and those who do not wish to prepare their own discs are referred to the copies of the photo-

graphic standards prepared by the Connecticut State Department of Health Laboratory, Hartford. The report states:

The standards on this photograph are based on pint samples of milk to which weighed amounts of sediment have been added. The 1931 standards cover the range from clean to very dirty milk with numerical ratings or sediment scores given for each disc. The 1939 standards have been simplified by the elimination of cleanliness ratings for dirty milk.

Persons outside of Connecticut placing orders for milk sediment standards should state whether the new 1939 Edition or the old 1931 Edition of the standard is desired. The price of the new 1939 Edition is sixty cents, but the price of the old 1931 Edition will remain \$1.00 a copy for the few persons who may wish to continue using the old standard.

THE FIRST ANNUAL SYMPOSIUM FOR INDUSTRIAL NURSES

THE Illinois State Department of Public Health, through its Divisions of Industrial Hygiene and Child Hygiene and Public Health Nursing, has arranged a symposium for industrial nurses in the state, to be held October 26-28, at the University of Illinois Medical School, in Chicago.

Coöperating organizations will be: Chicago Industrial Nurses Association, Greater Chicago Safety Council, Illinois Manufacturers' Association, American Industrial Hygiene Association, American Medical Association, and University of Illinois Medical School.

UNIVERSITY OF CALIFORNIA NURSING EDUCATION INSTITUTE

AS part of the Summer Session program of the University of California, the Division of Nursing Education of the Department of Hygiene held

a 3 weeks' Institute on "Social and Nursing Problems in the Control of Syphilis and Gonorrhea." Mrs. Evangeline Morris, of Simmons College, was the prime moving force of the Institute. Dr. Malcolm Merrill, Chief of the Bureau of Venereal Diseases, California State Department of Public Health, gave a well organized practical view of the medical aspects in the control of syphilis and gonorrhea.

Enrollment included public health nurses from state, city, and county health departments, Indian Service schools, Visiting Nurse Associations, American Red Cross Nursing Services, and nurses from clinic, general duty, and private duty fields.

TRI-STATE FOOD AND HEALTH OFFICIALS CONFERENCE

THE Tri-State Food and Health Officials Conference will meet at Pittsburgh on Wednesday, October 18, during the Annual Meeting of the A.P.H.A. This Conference is composed of health and milk control officials in the States of Ohio, West Virginia, and Pennsylvania. The officers are:

President: Julius A. Pizzoferrato
Secretary-Treasurer: Thomas Henderson
First Vice-President: Dr. Reese Pedicord
Second Vice-President: Elmer Harter
Editor: Leicester Patton

Their program will include papers by Dr. W. W. McFarland, President, Pennsylvania Public Health Association; Dr. Reese Pedicord, Wheeling, W. Va.; and Fred L. Schoenberger, Secretary, Ohio Dairy Products Association, Columbus, Ohio.

FILTERABLE VIRUSES RESEARCH

A NEW laboratory for the study of filterable viruses has been established at New Brunswick, N. J., by the Squibb Biological Laboratories. A special building has been equipped for the research.

Raymond C. Parker, Ph.D., a mem-

ber of the staff of the Rockefeller Institute for Medical Research, has been appointed Director.

PERSONALS

Central States

FORREST J. AUSTIN, M.D.,† formerly of Houghton, Mich., has been appointed Director of a district health unit for Webster, Calhoun, and Boone Counties, Iowa.

DR. HARRISON C. BLANKMEYER has been appointed Superintendent of Health of Springfield, Ill.

DR. GEORGE W. BOWMAN, of Indianapolis, Ind., has been appointed State Director for Venereal Disease Control in the Indiana State Health Department, succeeding DR. WENDELL C. KELLY, resigned.

DR. ADELBERT R. CHAMBERS, of Iola, Kans., has been appointed Health Officer of Allen County.

DR. HOWARD F. CRAIG, of Protection, Kans., has recently been appointed Health Officer of Comanche County.

DR. MAX L. DURFEE, of the staff of the Health Service of the University of Michigan, Ann Arbor, has been appointed Director of the Health Service at Iowa State Teachers College, Cedar Falls, Iowa.

MARIE A. HAGELE, M.D.,† of Chicago, Ill., has been appointed Regional Consultant in Maternal and Child Health for the Michigan State Department of Health.

KALMAN S. VON HAITINGER, M.D.,† formerly of the Hillsdale County, Mich., Health Department, has been appointed Health Officer of the Midland County Health Department, succeeding EDWIN H. PLACE, M.D.,† resigned.

ERWIN F. HOFFMAN, M.D., M.S.P.H.,† of Mason, Mich., has been appointed Director of the Dickinson County Health Unit, to succeed PHILIP E. M.

† Member A.P.H.A.

BOURLAND, M.D., M.S.P.H.,† of Iron Mountain, resigned.

DR. WENDELL C. KELLY, of Indianapolis, Ind., has resigned as State Director for Venereal Disease Control in the Indiana State Health Department, to become associated with Eli Lilly and Company.

DR. FLOYD H. KINYOUN has resigned as Health Officer of Omaha, Nebr., to enter private practice in Los Angeles, Calif.

DR. HERBERT R. SCHMIDT, of Newton, Kans., has been appointed Health Officer of Harvey County, to fill the unexpired term of the late Dr. WILLIAM F. SCHROEDER.

DR. ELLIS K. VAUBEL, of Indianapolis, Ind., has been appointed Assistant Director of the Division of Preventable Diseases of the Iowa State Department of Health, succeeding Dr. PAUL STEPHEN, who resigned to enter private practice at Manchester, Iowa.

Eastern States

CLIFFORD W. BEERS, of New York, founder of the mental hygiene movement, has resigned as Secretary of the National Committee for Mental Hygiene, after more than 30 years of service. He will continue his work as Secretary of the American Foundation for Mental Hygiene, and the International Committee for Mental Hygiene.

DR. JOHN L. BOND, of Lehigh, Pa., has been appointed Medical Director of Carbon County.

WALTER CLARKE, M.D.,† Executive Director of the American Social Hygiene Association, New York, N. Y., has been awarded the rank of Knight of the Legion of Honor by President Lebrun of France. The citation was made for Dr. Clarke's work with the

League of Red Cross Societies and other international health activities in which the French Government is interested.

JOHN B. GRANT, M.D., C.P.H.,* of the staff of the International Health Division, Rockefeller Foundation, who for more than 20 years has been assigned to China, has been appointed by the Government of India as Director of the All India Institute of Hygiene and Public Health and, concurrently, Professor of Public Health Administration. Dr. Grant arrived in Calcutta late in June to begin his responsibilities.

DR. MILTON E. KIRKPATRICK, of New York, recently Director of a child guidance center at Lansing, Mich., has been appointed Director of the Division on Community Clinics, of the National Committee for Mental Hygiene, New York, N. Y. He succeeds Dr. GEORGE S. STEVENSON, who recently became Medical Director of the National Committee for Mental Hygiene.

DR. GEORGE A. MARSDEN, of Oswego, N. Y., has been appointed City Health Officer, to succeed the late Dr. JAMES E. MANSFIELD.

ROSCOE L. MITCHELL, M.D.,† Assistant Director of the Bureau of Health in the Maine State Department of Health and Welfare, has been appointed Director, to succeed GEORGE H. COOMBS, M.D.†

DR. JAMES E. PETERMAN, M.D.,† of Cherry Tree, Pa., has been appointed District Medical Director of Indiana, Armstrong, and Jefferson Counties.

DR. ANTHONY J. SPARTA, of Easton, Pa., has been appointed Medical Director of Northampton County, succeeding Dr. FRANK J. CONAHAN, of Bethlehem.

HOWARD CANNING TAYLOR, JR., M.D., of New York, has been appointed to the William Goodell Professorship at

* Fellow A.P.H.A.

† Member A.P.H.A.

the University of Pennsylvania School of Medicine.

KATHRYN C. TRENT,[†] of Dover, Del., has resigned as Director of the Division of Public Health Nursing for the Delaware State Board of Health, which position she has held for the past 4 years, to accept a position with the Birth Control Federation of America as a Supervisor of the Southern Region. Her southern address is not yet announced.

ALLAN A. TWICHELL,[†] of New Haven, Conn., Technical Secretary of the American Public Health Association's Committee on the Hygiene of Housing, lectured at the Housing Management Training Institute held at New York University, July 24-August 18. His subject was "Current Thoughts on the Relation of Housing to Health, Delinquency and Other Major Social Problems." The Institute was conducted in coöperation with the National Association of Housing Officials and with the Assistance of Staff members of the United States Housing Authority.

DR. MATTHEW P. WARD, of Brownsville, Pa., has been appointed Medical Director of Fayette County, to succeed Dr. J. GLENN HEMINGTON, of Uniontown.

J. M. WISAN, D.D.S.,* of Elizabeth, N. J., has been appointed Consultant to the Dental Health Education Program of the New Jersey State Department of Health. Dr. Wisan was chairman of the Council on Mouth Hygiene of the New Jersey State Dental Society for a number of years, and during the past year he has served as Secretary of the Oral Health Group, American Public Health Association.

Southern States

DR. FLETCHER R. ADAMS, of Monroe, N. C., Health Officer of Union

County, has been appointed Health Officer of Catawba County, to succeed DR. CLARENCE H. WHITE, formerly of Newton, N. C., and now of Philadelphia, Pa.

DR. NEALE M. ATKINS, of Greenville, Ky., Health Officer of Muhlenberg County, has been transferred to Graves County, to take charge of a new unit with headquarters at Mayfield. DR. JAMES R. BARCUS, of Gladewater, Tex., has been appointed Health Officer of the town.

DR. RICHARD B. AUSTIN, of Forest, Miss., has been named part-time Health Officer in Scott County, filling the unexpired term of DR. WILLIAM E. ANDERSON.

DR. LOREN V. BAKER, of Elk City, Okla., has been appointed Health Officer of Beckham County.

DR. JOSHUA P. BEAM, of Arnett, Okla., has been appointed Health Officer of Ellis County.

DR. WILLIAM PRICE BITTINGER, of Summerlee, W. Va., has been appointed a member of the Public Health Council, succeeding the late DR. SAMUEL W. PRICE, of Scarbro.

DR. WILLIAM S. CARY, of Reydon, Okla., has been appointed Health Officer of Roger Mills County.

DR. GEORGE R. CREEKMORE, of Brooksville, Fla., has been appointed a member of the Board of Commissioners of Hernando County.

DR. JOHN I. DERR, of Waurika, Okla., has been appointed Health Officer of Jefferson County.

DR. DONALD W. DYKSTRA, of Morrilton, Ark., has been appointed in charge of the new Syphilis Control Division of the Arkansas State Department of Health. He will assist ARTHUR M. WASHBURN, B.S., M.D.,[†] of Little Rock, Director of the Division of Communicable Disease

* Fellow A.P.H.A.

[†] Member A.P.H.A.

Control. Another member of the new Division will be ARTHUR B. PRICE, M.D., M.P.H., of the U. S. Public Health Service, who has been assigned to the State Department for a year of field training.

DR. PAUL T. ERICKSON, of the U. S. Public Health Service, arrived in Jackson, Miss., recently to launch a year's program in the control of venereal diseases, in coöperation with the Mississippi State Department of Health.

DR. FRANCIS POLK FRY, JR., of Frederick, Okla., has been appointed Health Officer of Tillman County.

DR. SIMON S. GARRETT, of Duncan, Okla., has been appointed Health Officer of Stephens County.

DR. ELLERY C. GAY, of Little Rock, Ark., has been appointed Medical Supervisor of the Crippled Children's Division of the Arkansas State Department of Public Welfare, serving on a part-time basis. He succeeds DR. LEE VALLETTE PARMLEY, resigned.

PAUL M. GOLLEY, M.D.,† of Chapel Hill, N. C., has been appointed Health Commissioner of Walker and Catoosa Counties, Ga., succeeding DR. RICHARD C. SHEPARD, resigned.

DR. WILLIAM F. GRIFFIN, of Watonga, Okla., has been appointed Health Officer of Blaine County.

WILLIAM GROSSMAN, M.D.,† Epidemiologist of the Virginia State Health Department, Richmond, Va., has been appointed Director of the Bureau of Communicable Diseases, succeeding G. FOARD MCGINNES, M.D.*

DR. FERDINAND R. HASSLER, JR., of Seminole, Okla., has been appointed Health Officer of Pottawatomie County.

DR. DON V. HATTON, of Leitchfield,

Ky., has resigned as Health Officer of Grayson County, to take a similar position in Virginia.

EDWARD M. HOLMES, JR., M.D.,† formerly Health Officer of Fairfax County, Va., has been appointed Director of the Division of Venereal Disease Control of the Virginia State Department of Health, Richmond, Va.

DR. JOHN B. HOZIER, of the U. S. Public Health Service, has been detailed to the West Virginia State Department of Health, at Charleston, as Acting Director of the Bureau of Venereal Disease, in the absence of DR. CHARLES N. SCOTT, who will spend a year at Johns Hopkins University.

DR. CHARLES F. HULL, of Carthage, Tex., has been appointed Health Officer of Panola County.

DR. MELVIN L. HUTCHESON, of Denton, Tex., has been appointed Health Officer of Denton County.

DR. WALTER R. JOBLIN, of Porter, Okla., has been appointed Health Officer of Wagner County.

RANSOM J. JONES, M.D.,† of Poplarville, Miss., formerly Director of the Pearl River County Health Department, has been named to a similar position in the southeastern district which was organized in March, composed of George, Greene, Perry, and Stone Counties; DR. JOHN W. DUGGER, of Jackson, has been acting head.

DR. LLOYD T. LANCASTER, of Cherokee, Okla., has been appointed Health Officer of Alfalfa County.

DR. BERT H. MALONE has been appointed Regional Medical Director of the Southeastern Regional Office, with headquarters in Waycross, Ga. This is one of the six regional health units that have been established under the supervision of the Georgia State Department of Health in an expanded state health program.

* Fellow A.P.H.A.

† Member A.P.H.A.

Other new directors are:

Dr. Robert B. Griffin, Northwestern District, Marietta, Ga.

Dr. Aaron Wilson Brown, Northeastern District, Gainesville, Ga.

Rufus Floyd Paync, M.D.,* West Central District, Griffin, Ga.

Dr. John M. Walton, East Central District, Swainsboro, Ga.

Lester M. Petric, M.D.,* Southwestern District, Albany, Ga.

HERBERT A. McCCLURE, M.D.,† of Butler, Ala., Health Officer of Choctaw County, has been appointed Health Officer in Lamar County, with headquarters in Vernon; he succeeds Dr. DANIEL R. BROWN, resigned.

DR. ROBERT K. MCINTOSH, JR., of Tahlequah, Okla., has been appointed Health Officer of Cherokee County.

DR. HUGH H. MONROE, of Lindsay, Okla., has been appointed Health Officer of Garvin County.

JOSEPH W. MOUNTIN, M.D.,* Senior Surgeon, U. S. Public Health Service, Washington, D. C., has been relieved from his assignment in charge of public health methods at the National Institute of Health, Bethesda, Md., and detailed as Assistant Surgeon General in charge of the Division of Domestic Quarantine. He succeeds Assistant Surgeon General CLIFFORD E. WALLER,* who has been assigned to duty in the Surgeon General's office in charge of the General Inspection Office.

DR. JAMES O. NALL, of Clay, Ky., has been appointed Health Officer of Lawrence County, with headquarters at Louisa.

JACK B. PORTERFIELD, M.D.,† of Williamsburg, Va., Health Officer of the Peninsula District, has been made Epidemiologist of the Virginia State Department of Health, Richmond, Va.

DR. JAMES C. RUMLEY, of Stigler,

Okla., has been appointed Health Officer of Haskell County.

WILLIAM V. SANFORD, M.D.,† of Cleveland, Tenn., for 9 years Director of the Bradley County Health Department, has been appointed Health Commissioner of Chattanooga; he succeeds Dr. JOHN W. L. COOPER, who resigned to devote full time to private practice.

DR. HARRY A. SMITH, of Wheeling, W. Va., has been appointed Health Officer of Wheeling and Ohio County.

DR. WILLIAM D. SMITH, of Senatobia, Miss., has been appointed Health Officer of Tate County, succeeding Dr. JOHN SIDNEY EASON, of Coldwater.

DR. DAVID B. SNELLING, of Tuscumbia, Ala., formerly Assistant to the Health Officer of Colbert County, has been appointed Health Officer of Choctaw County; he succeeds HERBERT A. McCCLURE, M.D.,† of Butler, who has taken a similar position in Lamar County.

DR. JOHN E. TATE, of Ripley, Miss., has been appointed Health Officer of Tippah County, for a 2 year term.

DR. STUART P. VANDIVIERE, of Franklin, N. C., has been placed in charge of the Baldwin County, Ga., Health Department.

DR. JOHN G. WELCH, of Port Neches, Tex., has been appointed Health Officer of Beaumont.

DR. ROBERT K. WILSON, of Dothan, Ala., has been appointed Health Officer of Pickens County, succeeding Dr. HORACE C. HUNT, of Livingston, who resigned to enter private practice of medicine.

Western States

JACQUES P. GRAY, M.D., M.P.H.,* who for two years has been Director of Public Welfare in the City and County of San Francisco, Calif., has resigned, effective August 15, to become lecturer in public health in the

* Fellow A.P.H.A.

† Member A.P.H.A.

Department of Hygiene, University of California, Berkeley. Dr. Gray will be responsible for courses in the Department organized by the late Dr. John Force on child health, community control of the communicable diseases, elementary public health, and advanced epidemiology.

EDWARD E. HAMER, M.D., of Carson City, formerly States Health Officer of Nevada, was recently reappointed to that position.

WILLIAM M. MCKAY, M.D.,† of Salt Lake City, Utah, Director of the Division of Communicable Disease Control of the Utah State Board of Health, has been made Acting State Health Commissioner, while JOHN L. JONES, M.D.,* the Health Commissioner, is conducting a survey of occupational disease in the state.

DR. EUGENE W. ROCKEY, of Portland, Ore., has been appointed Chief of Staff of the Industrial Accident Commission, succeeding DR. LOUIS P. GAMBEE. Dr. Rockey held this position once before.

DR. KENNETH M. SODERSTROM, of Seattle, Wash., was recently appointed to the staff of the Division of Epidemiology in the Washington State Department of Health, in charge of tuberculosis control, a newly created position.

DR. RICHARD H. WILCOX, of Pierre, S. D., has been appointed Health Officer of Umatilla County, to succeed ALFRED H. MACLAREN, M.D.,† who will enter private practice in California.

Canada

DR. DUNCAN GRAHAM, of Toronto, Ont., was named President-Elect of the Canadian Medical Association, at the recent annual meeting in Montreal.

DR. MORLEY S. LOUGHEED, City Bacteriologist for several years, has been appointed Health Officer of Winnipeg, Man., to succeed DR. ALEXANDER J. DOUGLAS, M.D.,* who is retiring after nearly 40 years of service.

DR. HERBERT C. GEORGE, of Regina, Sask., has been appointed Medical Director of Cancer Services for the Saskatchewan Cancer Commission and Director of the Regina Cancer Clinic; and DR. ALLAN W. BLAIR, of Toronto, Ont., has been made Supervisor of Radiotherapy for the Commission and Radiotherapist of the Clinic.

Foreign

LEONIDES ANDREU ALMAZAN, M.D.,† of Mexico City, has resigned as Chief of the Department of Public Health in Mexico, and has been succeeded by DR. Y GRAL. JOSE SIUROB, who was his predecessor for several years in the same position.

DEATHS

ERNEST C. DICKSON, M.D.,* of San Francisco, Calif., Professor of Public Health and Preventive Medicine at Stanford University Medical School, died August 23.

JOSEPH E. GERMAIN, D.P.H.,† Director of Rimouski Health Unit, Rimouski, Que., Canada, died recently, at the age of 53.

DR. HAROLD RYPINS, Secretary of the New York State Board of Medical Examiners, Albany, N. Y., died recently.

F. E. TROTTER, M.D.,† President and Executive Officer, Territorial Board of Health, Honolulu, T. H., died recently.

* Fellow A.P.H.A.

† Member A.P.H.A.

CONFERENCES AND DATES

- American Association for the Advancement of Science. Annual Meeting—Columbus, Ohio, December 27, 1939–January 2, 1940.
- American Clinical and Climatological Association. Saranac Lake, N. Y. October 9–11.
- American College of Surgeons. Philadelphia, Pa. October 16–20.
- American Education Week — 1939. Theme, "Education for the American Way of Life." November 6–11.
- American Public Health Association. 68th Annual Meeting. Hotel William Penn, Pittsburgh, Pa. October 17–20.
- American Public Welfare Association. Round Table and Annual Meeting. Washington, D. C. December 6–10.
- American Public Works Association. Pittsburgh, Pa. October 9–11.
- American School Health Association. Hotel William Penn, Pittsburgh, Pa. October 16–20.
- American Statistical Association—Annual Meeting. Philadelphia, Pa. December 27–30.
- American Water Works Association:
- Four States Section. Berkshire Hotel, Reading, Pa. October 5–6.
 - Missouri Valley Section. Hotel President, Kansas City, Mo. October 11–13.
 - West Virginia Section. Morgan Hotel, Morgantown, W. Va. October 12–14.
 - Southwest Section. Adolphus Hotel, Dallas, Tex. October 16–19.
 - New Jersey Section. Claridge Hotel, Atlantic City, N. J. October 20–21.
 - California Section. Fairmont Hotel, San Francisco, Calif. October 25–28.
 - Wisconsin Section. Hotel Raulf, Oshkosh, Wis. October 30–November 1.
- New York State Section. Hotel Utica, Utica, N. Y. November 2–3.
- North Carolina Section. Hotel Charlotte, Charlotte, N. C. November 6–8.
- Association of American Medical Colleges. Cincinnati, Ohio. October 23–25.
- Association of Women in Public Health. Century Club, Pittsburgh, Pa. October 16.
- Central Society for Clinical Research. Chicago, Ill. November 3–4.
- Civil Service Assembly of the United States and Canada. San Francisco, Calif. October 16–20.
- Civil Service Assembly—Western Regional Conference. San Francisco, Calif. October 17.
- Colorado Public Health Association. Colorado Springs, Colo. October 3–4.
- Convention for the Revision of the Pharmacopoeia of the United States. Washington, D. C. May 14, 1940.
- Directors of Local Health Services Conference. Hotel Roosevelt, Pittsburgh, Pa. October 16.
- First Annual Symposium for Industrial Nurses. Presented by the Department of Public Health of the State of Illinois. University of Illinois Medical School, Chicago, Ill. October 26–28.
- Florida Public Health Association. Jacksonville, Fla. December 7–9.
- Health Education Institute—American Public Health Association, Annual Meeting. Hotel William Penn, Pittsburgh, Pa. October 15–17.
- International Association of Milk Sanitarians, Inc.—Annual Meeting. New Hotel Mayflower, Jacksonville, Fla. October 25–27.
- International Heating and Ventilating Exposition—Sixth. Under auspices

- of the American Society of Heating and Ventilating Engineers, and coinciding with its 46th Annual Meeting. Lakeside Hall, Cleveland, Ohio. January 22-26, 1940.
- International Society of Medical Health Officers. Hotel William Penn, Pittsburgh, Pa. October 16.
- Michigan Public Health Association. Grand Rapids, Mich. November 8-10.
- Mississippi Public Health Association. Jackson, Miss. December 6-8.
- Municipal Public Health Engineers Conference. Hotel William Penn, Pittsburgh, Pa. October 16.
- National Association for Nursery Education—Biennial Meeting. Hotel Pennsylvania, New York, N. Y. October 25-28.
- National Association of Housing Officials. New Orleans, La. November 22-24.
- National Association of Public School Business Officials. Cincinnati, Ohio. October 16-20.
- National Association of Sanitarians. Oakland, Calif. December.
- National Hearing Week—12th. Announced by the American Society for the Hard of Hearing. October 22-28.
- National Organization for Public Health Nursing. Hotel William Penn, Pittsburgh, Pa. October 15-16.
- National Pest Control Association—7th Convention. Hotel Pennsylvania, New York, N. Y. October 23-25.
- National Recreation Congress—24th. Boston, Mass. October 9-13.
- National Safety Congress and Exposition—28th. Atlantic City, N. J. October 16-20.
- National Society for the Prevention of Blindness. Annual Conference. Hotel Astor, New York, N. Y. October 26-28.
- National Warm Air Heating and Air Conditioning Association. Cleve-
- land, Ohio. January 22-26, 1940.
- New Jersey Health and Sanitary Association—65th Annual Meeting. Berkeley-Carteret Hotel, Asbury Park, N. J. November 24-25.
- New Mexico Public Health Association. LaFonda Hotel, Santa Fe, N. M. October 25-28.
- New York State Association of Public Health Laboratories. Mid-Year Meeting. State Laboratory, Albany, N. Y. November 3.
- New York State Sewage Works Association. Olean House, Olean, N. Y. October 6-7.
- Pennsylvania Public Health Association—Meeting with American Public Health Association. Hotel William Penn, Pittsburgh, Pa. October 18.
- Southern Branch, American Public Health Association—8th Annual Meeting. Memphis, Tenn. November 21-22.
- Southern California Public Health Association. Long Beach, Calif. January 24, 1940.
- Southern Medical Association. Memphis, Tenn. November 21-24.
- State Laboratory Directors Conference. Hotel William Penn, Pittsburgh, Pa. October 16.
- State Sanitary Engineers Conference. Hotel William Penn, Pittsburgh, Pa. October 16-17.
- Texas Public Health Association. Galveston, Tex. October 2-4.
- Tri-State Food & Health Officials. Hotel William Penn, Pittsburgh, Pa. October 18.
- West Virginia Public Health Association. Hotel Fairmont, Fairmont, W. Va. November 6-8.

SIX NEW HEALTH AND CHARACTER BUILDING FILMS

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Orientation in Public Health*

JOSEPH W. MOUNTIN, M.D., F.A.P.H.A.

United States Public Health Service, Washington, D. C.

WHEN preparing this paper, I was first impelled to detail some of the technics being used in the evaluation of public health procedures. But on setting them down for inspection and further delineation, it became obvious that there is no technic peculiar to studies of administrative practice. As in the case of epidemiology, the occasion may arise for drawing upon any method that has been found useful in political, social, or biological fields of inquiry. One question may be explored by statistical analyses of morbidity and mortality data; another by making physical examinations, supplemented perhaps by laboratory tests, of particular population groups; problems relating to environment may give rise to questions of an engineering character; perhaps it is the efficacy of an immunization or a therapeutic measure that is to be tested, thus a clinical approach may be needed to settle the issues involved. Since the words "public health" usually connote mass action and considerable measure of popular support, social concepts, economic resources, and costs of service

must be taken into account no less than the effectiveness of the public health procedure itself; hence the necessity often arises for having political, social, and economic sciences represented in studies of administrative practice. Perhaps the latest development in evaluation is the attempt of a few workers to utilize technics of educational measurements in the appraisal of health education.

Any one among a number of subjects might have been selected to illustrate the application of these several technics and disciplines, but at this time orientation with respect to needs and opportunities seems the most important item for study. By way of introduction, the broad question of orientation may be phrased in three separate but related parts: What is the status of the nation's health? What controllable factors are most influential in determining this status? What sort of organized effort on the part of society is needed so that individuals and communities may achieve the highest attainable level of well-being?

As measures of the nation's health, morbidity and mortality still hold commanding positions in the estimation of

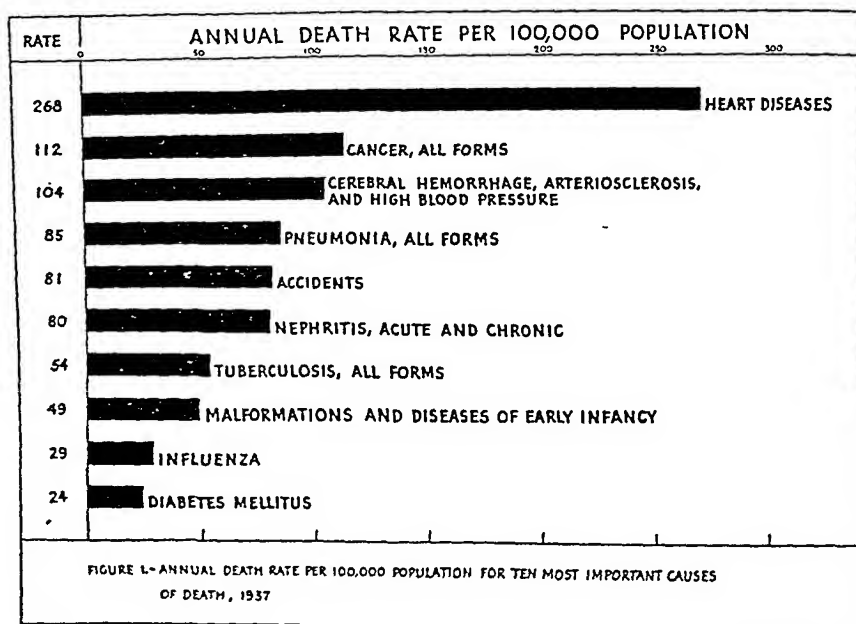
* Read before the Tenth Annual Meeting of the Western Branch, American Public Health Association, Oakland, Calif., July 23-28, 1939.

public health analysts, although the slogan "positive health" which came into popular usage some 25 years ago has tended to divert attention from the more obvious expressions of human vitality. Of the two, death is the more definite phenomenon. However, it happens only once in the life of the individual whereas illness occurs many times. Illnesses of certain types are prone to terminate fatally, while others tend to be self-limited and usually end in recovery after varying periods of disability. As a matter of fact, the common cold is among the most frequent causes of illness; yet this condition is not accepted as a primary cause of death. Thus it is evident that gross mortality rates cannot be translated into illness rates, especially if one wishes to obtain an expression of disability and costs accruing therefrom.

The characteristics of mortality data and the whole procedure of certification are well understood by the group to which this paper is addressed. On the other hand, systematic collection and analysis of sickness data are rather new ventures in public health

practice; hence a few words on procedure may not be out of place.

Perfection in a morbidity intelligence service would entail a medical diagnosis for every departure from normal experienced by all members of the population, this to be reported to some central agency. Such a scheme would, of course, fall of its own weight. Furthermore, this plan is not practicable under present conditions, even in a modified form, since physicians do not see all cases of illness; neither has it been deemed expedient to make systematic reporting compulsory. Records of persons covered by prevailing sick benefit schemes afford valuable information, but these persons are highly selected as a rule on the basis of age, sex, occupation, geography, and other factors. In surveys of general illness, collecting information, by means of the family interview, from representative samples of the population, has proved to be the method of choice under present circumstances. For particular diseases, especially of the more serious types that are apt to receive medical attention, the information may

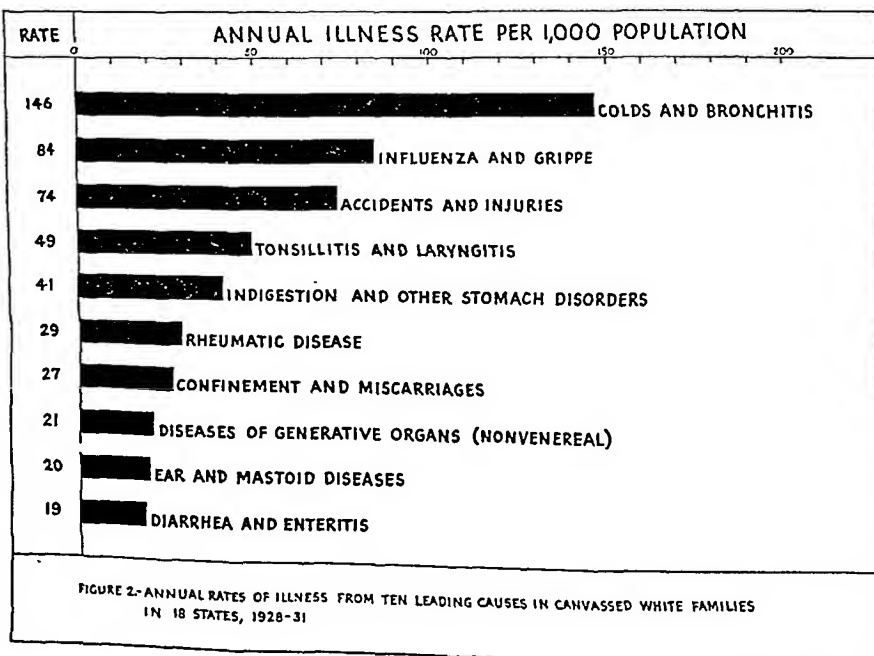


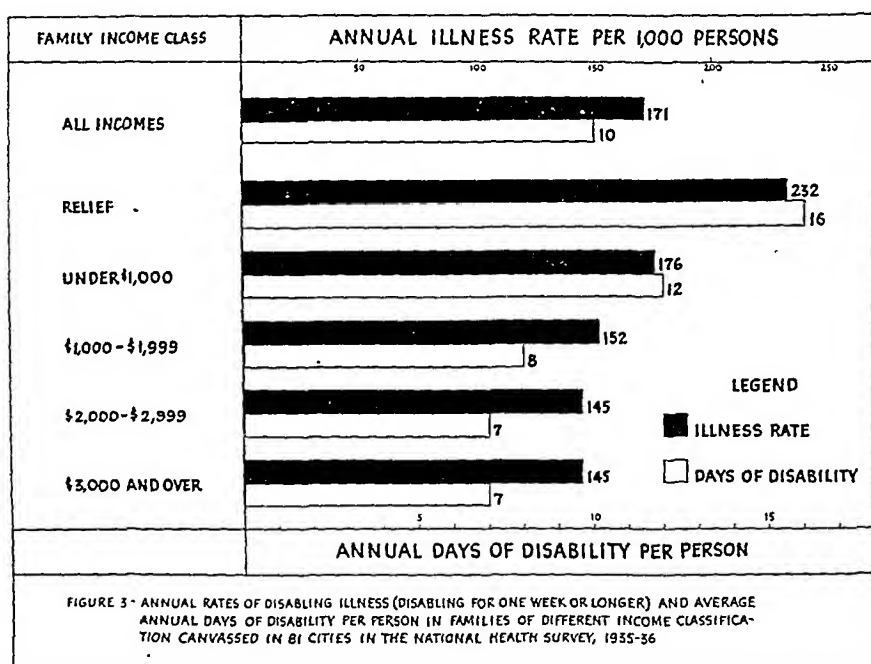
be obtained directly from physicians, hospitals, and clinics. Data on illness collected in either manner, when coupled with mortality records, furnish criteria for estimating the health status of a community that are sufficiently reliable to guide administrative action. It is rather strange that public health practice has been influenced in only a minor way by the very obvious leads that flow from such data. A few well known vital phenomena are contrasted with administrative practice to show obvious failure in the use of available information.

Very young infants, for example, have not shared equally in the reduction of mortality which has been accomplished for children of all other ages; notwithstanding, most health departments concentrate attention on older children at the expense of infants. At the other end of the scale there are accumulating large numbers of persons in the advanced age brackets who have reached the period when vital forces must be conserved; yet public health offers little to the adults who face chronic disease and declining economic efficiency.

The inappropriate distribution of public health effort becomes more apparent when mortality is analyzed by specific causes. To illustrate this point, ten of the most important causes of death in 1937¹ arrayed in the order of frequency are presented in Figure 1. Aside from heart disease which presents a rate more than twice that of its nearest competitor, other rates descend in regular order of magnitude from cancer with 112 to diabetes with 24. These conditions taken together account for more than 79 per cent of all deaths. Against only one of them—tuberculosis—do health departments take very specific action at the present time. By contrast, the whole group of acute communicable diseases on which most public health effort is directed accounts for only 3 per cent of the mortality. This differential treatment cannot be justified on the basis of proportionate reward for effort.

Another and more revealing picture is obtained by using illnesses instead of deaths to measure need for service. As mentioned previously, a person dies only once, but he may be ill many times during the course of his life. Taken in





the main, the causes of illness are quite different from the causes of mortality. If case incidence is used as the unit of measurement, the ten most important illnesses² assume positions which may be noted in Figure 2. Upper respiratory infections lead by a wide margin; accidents constitute a potent cause of disability and so do stomach troubles. For a long time diarrhea was the only one of the group to arrest attention in public health programs. In some areas efforts are now being made to combine actual care at confinement with maternity hygiene service.

An appraisal of health department programs made on the basis of measures designed to affect diseases and conditions causing the greatest amount of illness discloses deficiencies even more glaring than the one based on mortality experience. In both instances, however, most of the neglected conditions are not in the so-called acute communicable groups and because of this characteristic they have been considered beyond the purview of public health agencies up to the present time.

Even under theoretically ideal con-

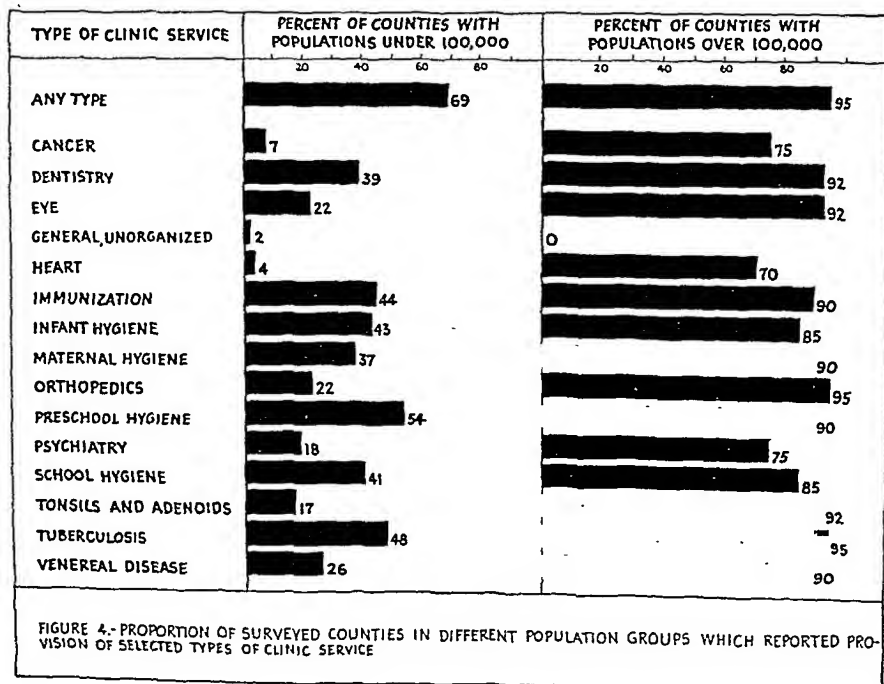
ditions where all acceptable preventive measures in programs of health might be taken, a certain amount of illness requiring medical care will occur. Its severity and consequences can be reduced by appropriate care. The magnitude of the prevailing illness burden as well as its differential distribution in respect to income groups of the population³ may be noted in Figure 3. Especially the families on relief and those with annual incomes below \$2,000 are afflicted most severely, irrespective of whether incidence or duration of illness be taken as the criterion. Other data⁴ accumulated by the Public Health Service but not presented on this occasion show that the amount of care which people receive is inversely proportionate to their income. Restorative measures must not be regarded as mere patchwork. Good medical care not only saves life but it also is a means of lessening disability which follows neglected illness. Social programs, especially of the assistance type undertaken on a broad scale within the past few years, have increased awareness of the rôle which illness plays in the

causation of disability and dependency. The course of events makes it quite clear that society is preparing to organize for health in a broad way as it has already done for other purposes. Especially health administrators must contemplate how their departments may serve the public interest in this area of social action. Apparently they are poorly prepared at the present time to accept enlarged responsibilities.

In connection with the National Health Inventory the total public health structure of the 94 study counties as expressed by organized agencies was examined from several points of view. Parenthetically it may be added that most of these counties contained larger centers of population; hence they are distinctly above the average in respect to number of inhabitants and per capita wealth. Despite the favorable position of these counties from the standpoint of resources, their expenditures for the limited services commonly assigned to organized health agencies were surprisingly low. For the group of coun-

ties as a whole, the annual per capita expenditure by all agencies, both official and nonofficial, was \$.86; of this amount \$.52 was contributed by the health department, \$.11 by other official agencies, and \$.23 by voluntary agencies.⁵ Another body of data, assembled in this instance by the Division of Domestic Quarantine, U. S. Public Health Service, reveals even smaller outlays per person. The data include reports from approximately 600 counties affording through use of public funds some type of health department service, each county operating as a separate unit. Within these 600 counties, usually small in population, the median annual expenditure by health departments is but \$.42 per capita. Obviously such low expenditures are not sufficient to permit reasonable development of the limited preventive services ordinarily encompassed by the usual program of health agencies.

The extent to which special clinics have been developed has become a rather critical index for judging the

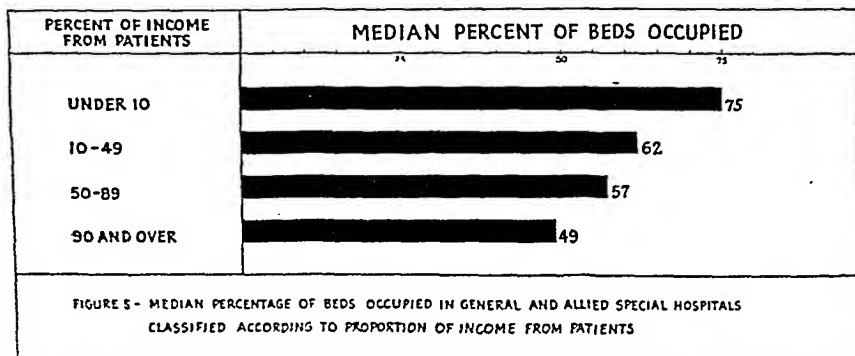


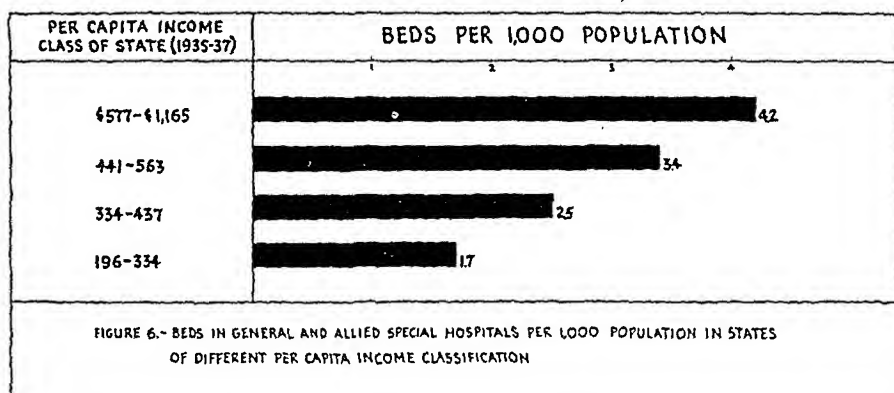
availability of preventive services. On this point the National Health Inventory disclosed some rather pertinent information for the 94 study counties⁶ which is presented in Figure 4. Opportunity for obtaining service of some type in a clinic classed as preventive is afforded in 70 per cent or more of the populous counties. In the group of counties having less than 100,000 inhabitants the presence of clinics is reported far less frequently. Here especially the variety of clinic service is restricted. Cancer and heart disease appear to be neglected more than other conditions in the scheme of clinic organization.

Another measure of opportunity for treatment outside the home lies in the existence and distribution of out-patient departments. According to a recent survey, there are about 770 organized departments attached to general and special hospitals, exclusive of federal, institutional, and proprietary hospitals.⁷ Roughly three-fourths of the existing departments are controlled by nonprofit bodies; the remainder by state and local governments. Like special preventive clinics, out-patient departments are concentrated in populous areas, especially in large cities of the northern and middle Atlantic seaboard and of the Great Lakes area. One hundred per cent of the cities with 250,000 or more inhabitants contain at least one out-patient department, while only 2 per cent of the cities with

less than 10,000 population have one or more such departments. Inasmuch as two-thirds of the aggregate hospitals owned by state and local governments and four-fifths of those operated by nonprofit bodies do not maintain organized out-patient departments, there is obviously possibility for expansion of services to ambulatory patients, especially to those of the indigent and marginal income classes whom out-patient departments are primarily designed to aid.

Since the hospital is coming to be regarded as a public health facility, it is incumbent on health administrators to learn the criteria by which to judge the adequacy and availability of hospital accommodations. On this point inquiries made by the Public Health Service show very clearly that primary consideration should be given to the scheme of financial support. Until the bed-days of care in free and part-pay categories bear a reasonable relationship to the income distribution of the population, estimates on available beds and percentage of beds occupied cannot be taken to express potential demand for hospital service. Data presented in Figure 5 substantiate this point.⁸ Hospitals that derive 50 per cent or more of their income from patients may expect their beds to be unoccupied about half the time. Obviously the mere existence of a hospital in a community is not a satisfactory criterion for judging the adequacy





or availability of a service. For a significant part of the population all charges must be remitted and for others rates must be geared to income of patients. Since a very large proportion of hospitals derive most of their income from patients, the distribution of hospitals as shown⁹ in Figure 6 should be no cause for surprise. In states where per capita income¹⁰ is lowest hospital accommodations are fewest despite the well known fact that low-income groups have the highest illness experience.

Nutritional advice may be cited as another type of service often rendered without specificity and without taking into account the realities of income. Health department workers in the nutritional field almost invariably tell their clients to drink more milk and eat more vegetables. As maxims these no doubt are more generally applicable than any others that might be substituted. The diets of families with greatly restricted incomes are generally supposed to be characterized by excess of calories and deficiency of vitamin and mineral content. A study by Wiehl and Palmer¹¹ of the summer diets of 600 selected poor families, however, leads to the conclusion that many families on relief or with very low incomes subsist on diets deficient also in energy value. In view of the very large percentage of the families who occupy the low income brackets one may ponder these points: How well

suited is standardized advice to the budget of the individual family? What specific nutritional defects do the proposed diets seek to correct? What curtailment of general food value in the family diet may result from the purchase of the proposed articles which are relatively expensive? It is hoped that the studies now in progress under the auspices of the Public Health Service and other agencies will enable the field worker to speak with greater assurance and specificity than is possible at the present time. Briefly, these studies are designed to appraise the various physical measurements together with the several chemical and biological tests applicable to human beings that are presumed to be of value in determining true metabolic deficiencies. By correlating these findings with food intake, it is hoped that more light may be thrown on the true effects of diet in relation to growth and development.

In the whole lexicon of public health perhaps no word is more often misapplied than "education." It is even alleged by some enthusiasts that all public health effort is basically education. Critics of actual practice have little difficulty in pointing out that much of the day-to-day activities of public health workers would not come within a very liberal definition of the term education. This should be no source of surprise since most of the personnel employed in health agencies

were trained to render a form of service that ordinarily has little or no educational content; yet these workers assume the rôle of educators upon finding employment in a health organization. Even if one may concede that the material used by health agencies is scientifically correct, the process of education has only begun when the person is informed. The recipient of this information must be activated to the point where he will follow the correct course irrespective of the inconvenience that may be entailed. It would therefore be well for the public health profession to apply to their educational efforts the criteria commonly used in evaluating the procedures designed to influence human conduct.

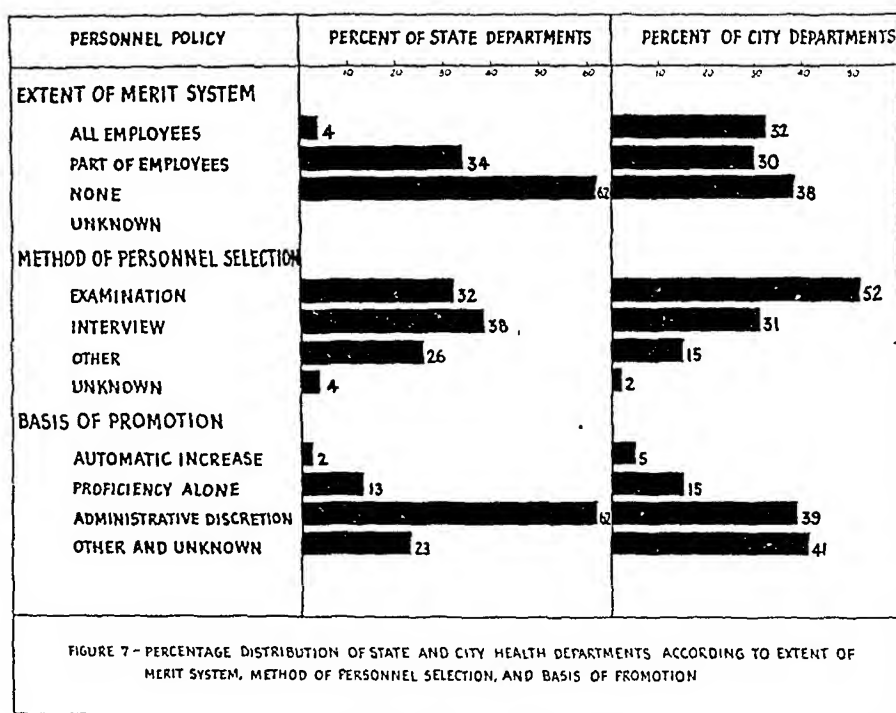
Those among the present generation who were inducted into public health work when Sedgwick reigned supreme regret the rather low position that is now accorded the routine sanitation activities of health departments. In large measure this fall from high esteem results from the fact that later day workers in this field pay less attention to biological principles on which sanitation should be based than did their forebears. Too much of current activity represents little more than rituals that have been solidified in codes and made impressive by gadgets. Up to now the more significant contributions of sanitation have been in the control of intestinal infections and infestations. Air-borne diseases, and some of virus origin, may yet be influenced by environmental measures. The effect of environment on physiological processes is appreciated but very poorly understood.

No doubt many of the administrative problems involving procedures on which questions may be raised, as well as the needs that remain unsatisfied, would have been resolved had the public health field been able to attract and retain a sufficient complement of per-

sonnel possessing the necessary qualifications. By qualifications is meant something more than mere scholastic attainments as expressed in credits and degrees. Occupying positions as health officers and bureau chiefs, we should like to see persons who combine sound judgment, professional competence, and strong emotional appeal. Most of the subordinate positions call for independent work; hence central direction and planning, no matter how well organized, can never be substituted for individual ability in the ranks. The building and maintenance of a suitable staff is a never-ending job. Induction, development, and replacement must go on simultaneously. That relatively few governments carry out even the first step in a systematic manner is illustrated in Figure 7.¹²

Only one-third of the states and under two-thirds of the cities with populations of 10,000 or over on which data were assembled by the Public Health Service employ any persons under a merit system. Personnel is selected by interview in roughly one-third of the jurisdictions; it is selected by examination in one-third of the states and in over one-half of the cities. Promotion is based on administrative discretion entirely or some scheme involving it as one of several factors in three-fifths of the states and two-fifths of the cities. Needless to say, such policies scarcely conduce to long tenure or security.

The situation among counties is not so clearly defined or so easily described as that for states and for cities. Inasmuch as state departments exert considerable financial and policy control over county departments, there results in effect a continuing effort toward a degree of conformity, not to say uniformity, of practice, that operates to stabilize the local departments. Literally, state departments require more systematic personnel procedure of

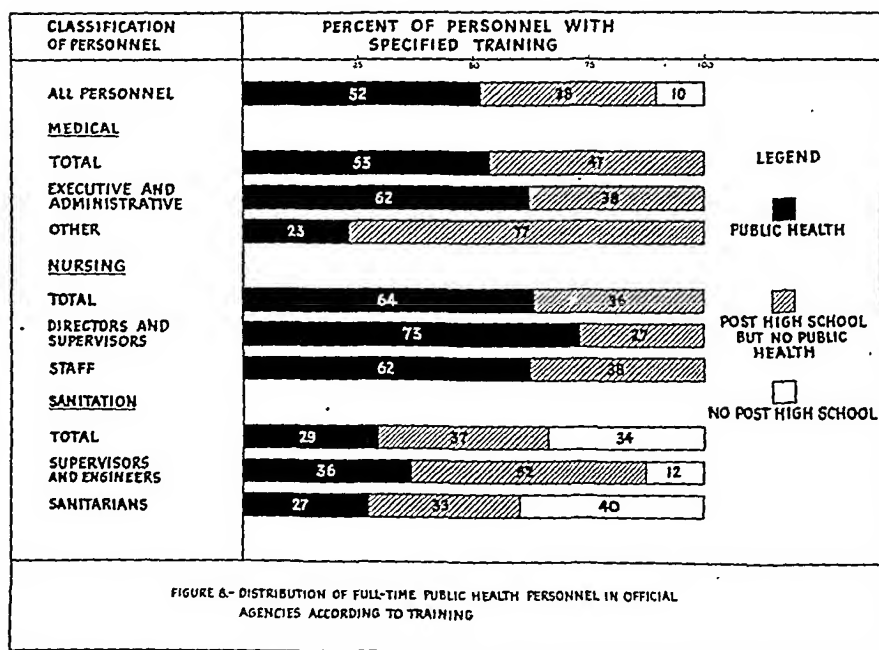


counties than they themselves show. While civil service and merit systems as such on a county basis are almost nonexistent, the professional character of the employers, as evidenced by tenure and training, is well above the average for all departments encompassed by the study. Aside from the influence on personnel policy that is exerted indirectly by the state health agency, through one device or another, counties and the smaller cities especially seem remiss in making necessary legal provisions for selection and advancement on a merit basis. As to retirement allowances, state and local governments have always been notoriously negligent.

By studying the employment record of health officers, one finds that a median of 3.4 represents years of employment for all full-time health officers listed in directories published by the Public Health Service during the period 1912-1935.¹³ With such frequent turn-over, the problem of training represents a rather discouraging task. It is a source of gratification,

however, to note that professionalization as expressed by length of full-time employment has gone on to a greater extent among staff employees than among chief administrators. As a result perhaps of the fact that large cities were first to develop full-time staffs of appreciable size, personnel in these political subdivisions show longer periods of service than obtain in either state or county organizations.

Despite the lack of legal provisions for security which characterizes public health positions, some encouragement may be found in the fact that slightly more than half of the aggregate full-time medical, nursing, and sanitation personnel in official agencies have attempted to equip themselves for their jobs by obtaining some type of instruction in their chosen work.¹⁴ It is true, however, that only one-third of those with training have attended what may be described as formal organized courses in public health work; the remainder of this group have received only field training, usually in the form of special courses of short duration.



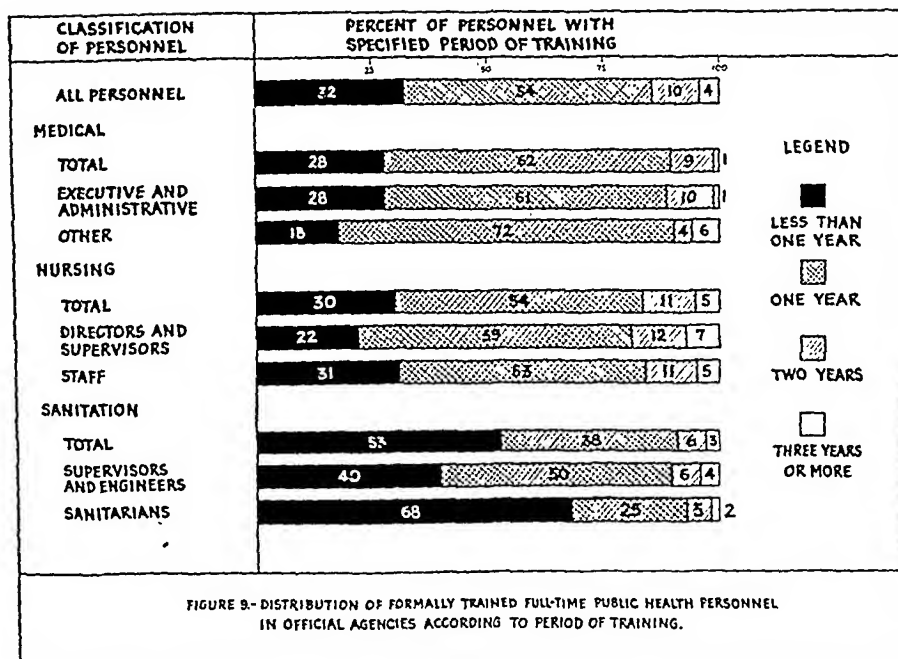
These points are illustrated in Figure 8.

From the standpoint of formal public health education, physicians take precedence, as 30 per cent of them report such training. Somewhat fewer have attended special or field courses; nearly one-half are without scheduled training. In contrast, only 20 per cent of the nurses have received formal instruction, but a much larger percentage have participated in special courses, so that only slightly more than one-third are without particular training. Sanitarians show least specialized preparation in that 71 per cent have failed to take either formal or special courses; 5 per cent possess formal training; and the rest have some measure of less systematic preparation. In the instance of each class of personnel—medical, nursing, and sanitation—a higher percentage of executives and supervisors than of staff members have received both formal and field instruction.

If the three classes as a whole are broken down by types of jurisdiction, county and district health department employees show substantially more specialized training than either city or

state employees. Almost two-thirds of all county employees are shown to have more than basic training, but only two-fifths of city and about one-half of state employees are so equipped. The outstanding groups, each of which shows over 70 per cent of its members with either formal or field public health training, are county health officers (71.7 per cent) and county nurses (71.7 per cent). State nurses, as a group, follow with 65 per cent thus trained.

The fact that certain classes of personnel have received either formal or field training gains significance when associated with the amount of time devoted to the various courses. Measurement of the duration of special courses is not attempted in this analysis since it is impossible to determine the intensity of such courses. In Figure 9 is given the distribution of formally trained personnel according to the periods spent in study. Obviously 1 year is the interval most commonly spent in special preparation since 54 per cent of all trained employees have devoted this period to additional study.



In one respect nurses are better equipped for their work than are either physicians or sanitarians, for 16 per cent have received 2 or more years of formal public health training as opposed to 10 per cent of the physicians and 8 per cent of the sanitarians. On the other hand, 30 per cent of the nurses have received less than 1 year of formal instruction, a figure slightly above that for medical personnel. With the possible exception of the medical class, employees serving in executive and supervisory positions have secured more prolonged training than have staff employees.

This paper, by design, has been somewhat broad and discursive in its coverage. In some respects it may be considered a departure from the main theme of this symposium—"Evaluation of Public Health Procedure." The broad subject "Orientation" was chosen because public health is dominated by the specialized groups within its ranks, who are concerned primarily with promoting their interests and perfecting their technics. Within limits this influence is desirable but there results a tendency to miss the forest

because of the trees. Especially in these days of changing social concepts and rapid development among all the sciences, it seems that we should pause for a moment now and then and pose for ourselves this rather colloquial question: Where are we and where do we go from here? That the people want health and are expressing a willingness to pay for it is evident. If the movement is to go forward under the banner of those agencies which bear the title "Department of Health," administrators must face some rather fundamental issues. These may be stated very briefly: How well suited is the orthodox program of health departments to the needs of the people? What rôle is the department willing to occupy in areas beyond its traditional interest? How well equipped are public health groups to carry such additional functions as they may be called upon to discharge? This paper represents an attempt to set up a few bench-marks for purposes of orientation and to suggest criteria for determining progress in selected fields, some of which are now occupied, others of which need to be explored.

REFERENCES

1. *Vital Statistics—Special Reports*, 6, 51 (Apr. 29), 1939. Bureau of the Census, Department of Commerce.
2. Collins, Selwyn D. *The Sickness Survey: Types, History, and Some Results*. To be published in revised edition of *Nelson's Loose-Leaf Preventive Medicine*.
3. Britten, Rollo H., and Collins, Selwyn D. *The National Health Survey: General Findings of a Nation-Wide Canvass of Sickness in Relation to Its Social and Economic Setting*. In preparation.
4. National Health Inventory. Preliminary Reports: Illness and Medical Care in Relation to Economic Status. *Sickness and Medical Care Surveys, Bull.* 2.
5. Mountin, Joseph W. How Expenditures for Selected Public Health Services Are Apportioned. *Pub. Health Rep.*, 52:1384 (Oct. 1), 1937.
6. Borowski, Anthony J., and Plumley, Margaret Lovell. Preventive Clinic Facilities Available in 94 Selected Counties of the United States. *Pub. Health Rep.*, 54:335 (Mar. 3), 1939.
7. Plumley, Margaret L. Location and Characteristics of 769 Out-Patient Departments. *Hospitals*, 11, 12 (Dec.), 1937.
8. Business Census of Hospitals, 1935. Unpublished data. Division of Public Health Methods, National Institute of Health. (Hospitals of Federal control are excluded from data presented in Figure V.)
9. Based on hospital data (excluding hospitals of federal control) published in *J.A.M.A.*, 110, 13 (Mar. 26), 1938.
10. Nathan, Robert R., and Martin, John L. *State Income Payments, 1929-37*. Bureau of Foreign and Domestic Commerce, Department of Commerce.
11. Wiehl, Dorothy G., and Palmer, Carroll E. Summer Diets of the Poor in Washington, D. C. *Milbank Quart.*, XVII, 1 (Jan.), 1939.
12. Ziegler, Mark V., and Brockett, Georgie S. Prevailing Employment Policies in Health Departments. Unpublished.
13. Mountin, Joseph W., and Pennell, Elliott H. Tenure of Office for Health Officers. *A.J.P.H.*, 28, 11 (Nov.), 1938.
14. Derryberry, Mayhew. A Study of Educational Qualifications of Staff Members of Health Departments. Unpublished.

Cross Purposes

AN unidentified newspaper clipping, presumably from a Philadelphia newspaper, carries the interesting information that a Philadelphia hospital and an antivivisection organization each received \$5,000 under the will of a woman who also bequeathed \$1,000 to a dog and cat hospital. This is an ironical comment on what was undoubtedly a totally unintended result of these bequests, namely that one of them will be used to defeat the purposes of the other two. The bequest to the hospital and to the dog and cat hospital will be used for the treatment of human beings and animals suffering from disease. This treatment will be preceded by diagnosis based on knowledge obtained from animal experimen-

tion. It will include methods of treatment, both medical and surgical, based on animal experimentation. Even the well chosen diets which will adorn the trays of the human patients and the rations which will restore ailing animals to their owners in prime condition are computed on the basis of information depending in large part on animal experimentation. The bequest to the antivivisection society will be used to cripple, harass, and defeat the efforts of scientists to use animals in the investigation of the remaining problems and mysteries in the field of health and disease. Thus unconsciously this testator has made one bequest which will neutralize and set at naught the effects of another.—*J.A.M.A.*, Aug. 19, 1939, p. 684.

The Problem of Maternity— A Survey and Forecast*

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THE problem of safeguarding maternity is an old one but the program which has been developed specifically to control the situation is, in this country at least, of recent origin. Quite a number of us, I am sure, participated in the early steps which were taken about 25 years ago. Many of us have seen the several stages in the development of a program which is now nation-wide and which has every earmark of being successful. While the accomplishments to date have not been startling, as in the campaign against tuberculosis, typhoid fever, or diphtheria, they have, nevertheless, been noteworthy and encouraging. We can now safely say that we have learned how to overcome what only recently looked like a serious deficiency in our medical practice. It is necessary only to make available more generally services which have proved effective.

For a long time the high maternal death rate of American women was nothing short of a disgrace. Everyone seemed to be conscious of the situation and deplored it. In the effort to enlist public support for the movement to reduce the hazards of childbearing, it was a common practice to show the maternal mortality rate of a long list of countries with the United States always appearing at the bottom of the

list or close to it. Only Chile and a few other countries of notoriously low medical standards showed conditions as bad or worse. The actual figure recorded was 7 maternal deaths per 1,000 live births in the states for which reliable data were then available. Special studies of underprivileged groups showed much higher figures—10 per 1,000 and even more in congested urban areas. In contrast, there were the Netherlands and the Scandinavian countries with maternal mortality rates under 3 per 1,000 live births. How did these countries with no better medical facilities, and with certainly no higher standards of life than our own, provide protection and services for their women which consistently produced maternal death rates less than one-half ours? That was the challenge.

Here certainly was an opportunity for the launching of a public health campaign which would win wide support. The Children's Bureau, established in 1912, took leadership in the movement, but with limited funds and no administrative authority accomplished relatively little in its early years beyond the publication of several studies and the distribution of minimum standards. It was not until the passage of the Sheppard-Towner Act in November, 1921, that an effective na-

* Presented at the American Congress on Obstetrics and Gynecology, Cleveland, Ohio, September 13, 1939.

tional movement was inaugurated. This legislation provided several million dollars of federal funds between 1922 and 1929 to those states willing to make necessary supplementary appropriations for maternity and infant welfare activities. The Act called for the establishment in each state of a responsible administrative agency, usually a child hygiene bureau. In this way standards of prenatal care formulated by the Children's Bureau were incorporated in the practice in the various states.

Even before the passage of the Act, many states had created maternity and child hygiene bureaus. At the beginning of 1921, 33 such state agencies were already in existence. By 1929 when the Act expired, maternity and child hygiene bureaus had been created in virtually every state in the Union. According to state reports, in the last 4 years alone more than 4,000,000 infants and preschool children, and about 700,000 expectant mothers were reached by some form of maternity and infancy work. It was thus primarily through federal activity that nation-wide interest was aroused in the welfare of mothers and babies, that large numbers of women received instruction in maternal and child hygiene, that public health nurses were appointed in large numbers to render services in the homes of pregnant women, and that steps were taken to reduce the menace of the inefficient and unclean midwife through registration, supervision, and instruction.

But from the very beginning there was the pressing need for a decisive demonstration of how best to organize a local effort to control the unnecessary maternal and infant tragedies. This object lesson in life conservation was the contribution of the Maternity Center Association of New York. This Association, organized in 1918 by a particularly able and determined group of women, soon became a militant and

effective center of service and propaganda. Frances Perkins was the first executive secretary and Mabel Choate, as president, provided the leadership. From its inception this association included a number of New York obstetricians, leaders in their field, who gave authority and direction to the plans. This is an appropriate time and place to record the unremitting labors of the late Dr. Ralph W. Lobenstine, the first chairman of the Medical Board of the Maternity Center Association, who watched and guided every step in the development of a sound program. This New York association and similar ones which have been organized since in other parts of the country are truly Dr. Lobenstine's monument.

The function of these Maternity Center Associations was first to develop a sound public opinion which would demand correction of the existing evils; second, to organize a local service which would demonstrate that safe maternity care could be made available to large numbers of women at a reasonable cost, and third, that such services could readily be extended to cover sizable areas of the population. The nucleus around which the service was developed was a local public health nursing group operating under close medical supervision in the homes of their clients and in clinics. While a few of the nursing leaders had acquired specialized training, the majority of the rank and file perfected their routine as they worked; for the art of prenatal nursing was still very young. They visited mothers at home and helped prepare them mentally and physically for labor and delivery. The nurses took blood pressure, temperature, and pulse readings, made urinalyses, watched for all the danger signs, listened to the fetal heart, checked on dental care, diet, rest, and the other essentials to healthful living. At the same time, the nurses concerned themselves with such conditions as poor

housing and family maladjustments, which interfered with the mother's peace of mind.

I was associated with this movement in New York City from the beginning, and I prepared with the assistance of the then director, Anne A. Stevens, the first study of the results which were achieved by the Maternity Center Association. The association provided, for the most part, only prenatal nursing care for its clients. The results were distinctly useful and encouraging. The intensive follow-up of the women through urinalysis and medical examination and subsequent advice reduced the number of maternal deaths from albuminuria and convulsions to one-third the usual number. Prenatal care was obviously effective in reducing the toxemias of pregnancy. This effort likewise reduced the number of infant deaths from prematurity by two-thirds and the number of stillbirths by about one-half.

The results were obviously good and were enthusiastically received as a great achievement. But on further analysis distinct limitations were found. Our study showed that deaths of mothers from causes other than toxemia had not been favorably affected. Deaths from the accidents of pregnancy and of labor, and from puerperal hemorrhage remained about the same as in the general population. Apart from prematurity, the hazards that affected babies during the first month of life were pretty much the same as in the population at large. One of the shocking results of our study of this experience was the very high mortality of mothers cared for by the association during pregnancy but delivered in some of the New York City hospitals, the rate being 11 per 1,000, or about twice that prevailing in the general population. Of the hospitalized cases, half of the deaths were due to septicemia. This study reflected the

inadequacy of the care given to women during and after labor in some hospitals in the city and proved, if further proof were necessary, that the program of the Maternity Center Association had been too narrowly conceived. Supervision of pregnancy was obviously of value, but in itself was not sufficient to safeguard the life of the mother and baby. Of equal, or even greater importance, was the preparation and supervision of the confinement and the postpartum care of the mother and child.

In 1922 the Maternity Center Association offered to the mothers under its care in the demonstration area medical and nursing supervision, instruction during pregnancy, help in arranging for delivery, nursing assistance at time of delivery, nursing supervision and instruction during the postpartum period, postpartum medical examination, and help in arranging medical supervision for the baby and further care for the mother when necessary. Each mother was urged to register as early as possible in pregnancy with the doctor or hospital physician who would deliver her. This was clearly a well rounded program intended to cover the entire maternity cycle and to supplement the existing medical and hospital facilities for delivery care. Fortunately a sizable group of women in the Demonstration Area took advantage of this service.

A new study of the results for the years 1922 to 1929¹ which I made in 1930 in collaboration with Hazel Corbin, Director of the Maternity Center Association, showed clearly that the care provided by the association reduced the mortality of mothers to about one-third of that among women in the control group. Deaths from eclampsia were entirely eliminated, those from sepsis greatly reduced, and the remaining few fatalities were, in the judgment of the Medical Board, unpreventable in

character. Stillbirths were 42 per cent lower, and infant deaths in the first month of life were reduced 32 per cent. I studied the records of the Frontier Nursing Service inaugurated by Mary Breckenridge in the difficult areas of the hills of Kentucky. The results were even more striking in terms of maternal lives saved through good nursing and skilled obstetric care as rendered by nurse midwives. On the basis of these demonstrations we were entirely justified in our claims that the lives of 10,000 women could be saved annually; that about 40,000 stillbirths could be prevented, and that some 30,000 infants who died under 1 month of age could be kept alive provided similar services and results were general for the women of the country.

While these maternity demonstrations were being developed in New York and in other large centers of the country, there was also an increasing awareness on the part of the medical profession that the woman in pregnancy and at confinement needed a larger measure of supervision and expert care than she was generally receiving. The profession now realized that the training of the average practitioner, and certainly that of the average midwife who were caring for the great majority of the confinements in this country was woefully inadequate. Special investigations were launched to determine in detail the circumstances under which women died in maternity, and to place more definite responsibility for these fatalities. The first comprehensive investigation was that planned and supervised by the members of the Obstetric Advisory Committee of the Children's Bureau. It covered an area of 15 states and the period was 1927 and 1928.² The facts revealed by this study led inescapably to the conclusion that maternal deaths were due in large part to controllable causes. The recommendations drafted by the Advisory Com-

mittee on Obstetrics advocated that physicians assume leadership in the program for control and that the general public be educated regarding the need for and meaning of adequate maternal care.

Perhaps more dramatic and significant in its nation-wide influence on the medical profession was a study begun in 1930 by the New York Academy of Medicine.³ This investigation covered a 3 year period and was extremely well organized by the leading obstetricians and gynecologists of New York to determine responsibility for each maternal death reported during the period. Every fatality due to a puerperal condition was investigated by personal interview with those connected with the case. The hospital records were studied at first hand. The evidence was carefully analyzed by expert committees, and all cases were assigned specifically to either preventable or non-preventable causes as the evidence indicated.

The investigation showed that two-thirds of all the deaths studied could have been prevented if the care of the woman had been proper in all respects, a finding which tallied remarkably well with that obtained by the Maternity Center Association and other groups in their preventive demonstrations. The study, as you all know, revealed a number of shocking conditions surrounding the care of childbearing women. Prenatal care was too often inadequate and improper. Operative interference during labor was resorted to in too many instances. Often the operation chosen was the wrong one, undertaken inopportunistically, and demanded greater training and skill than the attendant could command. Such was the objective judgment of the most skilled men of the profession on the evidence before them.

Sixty per cent of all the preventable deaths were traceable to some incapacity in the attendant—lack of skill,

lack of judgment, or careless inattention to the demands of the case. Some of the fatalities grew out of the fact that internes had too wide a field of independent activity. The investigation in addition showed that more than one-third of all preventable deaths were due to some failure on the part of the patient herself to take advantage of the facilities which are at hand for safeguarding her in the period of gestation and lying-in.

Hospital standards were inadequate in many instances. Proper facilities for labor and delivery were lacking, isolation was not always carried out promptly. In some proprietary hospitals, the operating room was also used as a delivery room. In some hospitals the resident staff was given too great responsibility. Exacting and difficult obstetrical operations were being performed by the junior members of attending staffs without consultation with their chiefs.

It was clear from this and from other investigations that both medical personnel and facilities were generally inadequate to insure safe maternity. For the national welfare it was necessary that better obstetrical training be given in the medical schools and in hospitals to qualify the rank and file of general practitioners; that specialists be designated only after adequate graduate study; that the nursing personnel and midwives receive more specialized training; that obstetric hospitals be architecturally segregated from the other services, and that in such hospitals operative procedure be more adequately supervised to assure necessary skill in those taking responsibility. Emphasis was placed on the need of full records as the basis of frequent and regular conference by the staff to determine the causes for failure.

But it takes time to set up facilities for the adequate care and supervision of women during pregnancy and in

their confinement in a country as large as ours. In spite of all the undoubted efforts of the medical profession and of the many groups of lay workers, public health nursing organizations and others, there was a long lag before the death rate from puerperal causes responded favorably. Even as late as 1930 the maternal mortality rate in this country was 6.7 per 1,000 live births, or only slightly less than the maximum of the earlier years. But since that year the mortality from puerperal causes has declined, at first slowly and later more rapidly and without interruption. By 1937 maternal deaths had already been reduced to 4.9 per 1,000 live births, a figure 27 per cent below that for 1930. Moreover, there is every reason to believe that when the rate for 1938 becomes available for the country as a whole, a further drop will be evident, almost to the point of 4 per 1,000 live births. Thus far in 1939 the same tendency is in evidence. In New York City and New York State, the figures for 1938 were 3.7 and 3.5 respectively. I am inclined to believe that a decline in the rate of about 10 per cent per annum is now prevailing generally over the country.

On further analysis we find that the decline in the maternal mortality rate reflects an increasing control over each of the major hazards of childbirth. The mortality for puerperal albuminuria and convulsions has dropped no less than 39.5 per cent between 1930 and 1937. For puerperal septicemia the rate per 1,000 live births has declined from 1.50 in 1930 to 0.95 in 1937, or 36.7 per cent. In the corresponding period, deaths from puerperal hemorrhage have been reduced by 14.5 per cent. Even deaths from abortion with septic conditions, which increased between 1930 and 1935, registered a substantially lower figure in 1937 than in 1930. (See Table 1.)

It appears then, from this brief

TABLE 1

NUMBER OF DEATHS PER 1,000 LIVE BIRTHS FROM PUERPERAL CAUSES, UNITED STATES
1930-1937

<i>Cause of Death</i>	1937	1936	1935	1934	1933	1932	1931	1930
The Puerperal State	4.88	5.68	5.82	5.93	6.19	6.32	6.60	6.73
Abortion with septic conditions	0.69	0.83	1.00	1.01	0.97	0.97	0.96	0.88
Abortion without mention of septic condition (to include hemorrhage)	0.26	0.31	0.27	0.26	0.30	0.34	0.30	0.30
Ectopic gestation	0.20	0.22	0.25	0.26	0.29	0.27	0.27	0.26
With septic condition specified	0.03	0.04	0.04	0.04	0.05	0.04	0.05	0.04
Without mention of septic condition	0.17	0.17	0.20	0.21	0.23	0.22	0.22	0.22
Other accidents of pregnancy (not to include hemorrhage)	0.04	0.03	0.03	0.04	0.04	0.04	0.04	0.07
Puerperal hemorrhage	0.59	0.65	0.63	0.64	0.64	0.66	0.68	0.69
Puerperal septicemia (not specified as due to abortion)	0.95	1.26	1.34	1.29	1.31	1.31	1.49	1.50
Puerperal septicemia and pyemia	0.95	1.25	1.34	1.29	1.30	1.31	1.48	1.49
Puerperal tetanus	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Puerperal albuminuria and eclampsia	0.98	1.04	1.03	1.12	1.21	1.28	1.43	1.62
Other toxemias of pregnancy	0.25	0.25	0.23	0.25	0.25	0.23	0.25	0.22
Puerperal phlegmasia alba dolens, embolus, sudden death (not specified as septic)	0.22	0.26	0.26	0.25	0.28	0.30	0.29	0.31
Other accidents of childbirth	0.64	0.76	0.71	0.74	0.84	0.87	0.83	0.80
Other and unspecified conditions of the puerperal state	0.01	0.02	0.01	0.01	0.02	0.02	0.02	0.02

(a) Less than .01 per 1,000 live births

survey, that the movement for maternal welfare has finally come into its own. As we have already pointed out, many influences have been at work. This is a good occasion to pay our respects to the public health nursing organizations of the country which have played a major rôle in the development of the campaign to control maternal mortality. Public health nurses have been the instruments for carrying the message into the home, whether the work done was under the auspices of state and local health departments or by local maternity associations. In most areas it was the local visiting nurse association which took upon itself the responsibility for educating mothers in the community regarding approved practices in prenatal care and confinement. We cannot exaggerate the importance of this nation-wide service carried on by 20,000 public health nurses in every state of the Union, and extending down to the smallest geographical subdivision.

A good example of an agency operating through visiting nurses is the

Metropolitan Life Insurance Company, which throughout this period has developed and made available a service to its policy holders to control unnecessary maternal deaths. At the very beginning of its welfare program in 1909, the company emphasized this phase of bedside nursing, and as the service grew to include a larger number of its policy holders, more and more emphasis was put on the care of mothers in pregnancy and postpartum. In some areas, such as Canada, more than half of all the nursing visits were concentrated on the care of the puerperal state. It is, therefore, interesting to observe what has occurred in this group of people, for the most part the wives of wage earners living in congested areas of cities. In 1911, the first year for which data are available, the puerperal mortality rate among the millions of industrial policy holders was 19.8 per 100,000 lives insured. In 1938, the figure had been reduced to 6.2, or a reduction of almost 70 per cent. During this period the birth rate, of course, likewise declined and it is,

Another major influence has been the activity of the medical profession in

raising the standards of obstetrical practice on a large scale. The results of the earlier surveys were evidently heeded, and we find in many large and even small centers an improvement of local organization for supervising hospital service, as well as individual practitioners. Fortunately the trend the country over has been toward more and more confinements under medical auspices and more particularly in hospitals. Dr. S. C. Runnels, Secretary of the Hospital Obstetrical Society of Ohio, summarizing this phase of the problem recently⁴ pointed out that the number of births in hospitals reporting to the American Medical Association has increased 46.5 per cent between 1934 and 1938, and, more important, that the increase has been entirely in the larger hospitals. Cases in hospitals handling more than 100 births a month increased 60 per cent; in those handling from 50 to 100 births, cases more than doubled.

UNITED STATES, 1935 - 1937

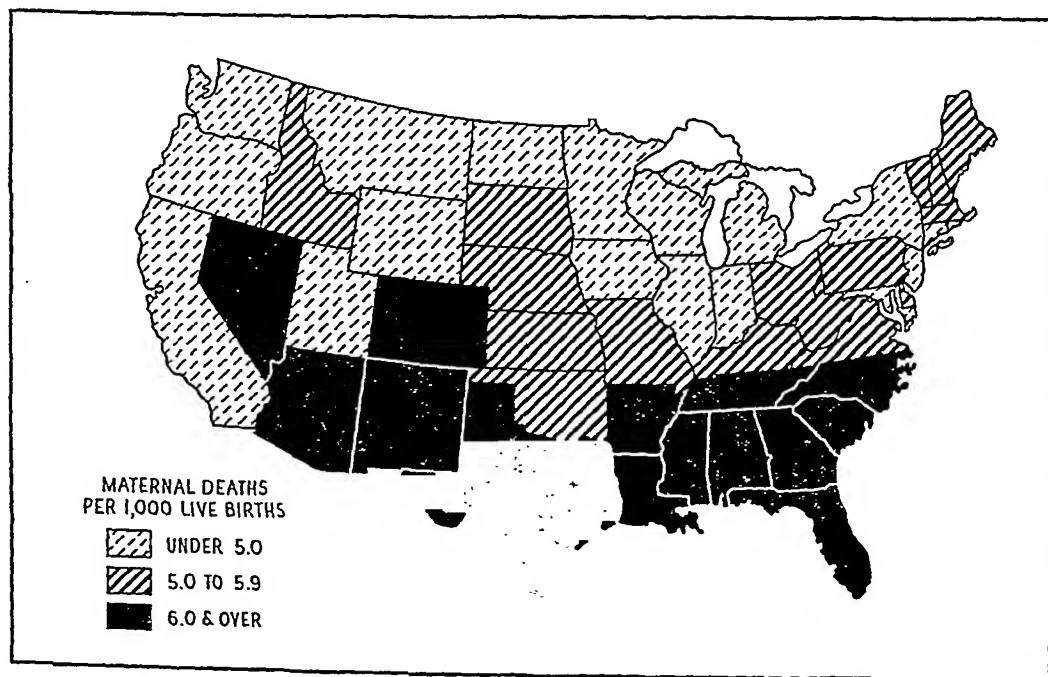


TABLE 2 — Maternal Deaths per 1,000 Live Births, Per cent of Live Births in Hospitals, and Per cent of Live Births Attended by Physician in White and Colored Population, by States, 1937.

State	Total				White				Colored			
	Birth Rates per 1,000 Population	Maternal Deaths per 1,000 Live Births	Percent of Births in Hospitals*	Percent of Births Attended by Physician	Maternal Deaths per 1,000 Live Births	Percent of Births in Hospitals*	Percent of Births Attended by Physician	Maternal Deaths per 1,000 Live Births	Maternal Deaths per 1,000 Live Births	Percent of Births in Hospitals*	Percent of Births Attended by Physician	Percent of Births in Hospitals*
United States	17.0	4.9	44.8	89.4	4.4	48.2	95.5	8.6	13.7	39.2		
Alabama	21.3	6.3	12.7	64.8	5.5	17.0	88.6	7.6	5.7	26.0		
Arizona	25.5	5.4	40.0	89.1	3.9	40.6	91.1	16.1	35.6	75.1		
Arkansas	17.2	6.8	8.6	72.4	5.8	11.2	89.8	10.0	.6	18.8		
California	15.3	4.1	78.2	98.4	4.0	79.3	99.0	5.8	55.1	87.0		
Colorado	18.3	5.4	48.6	98.4	5.2	49.6	98.4	17.5	50.7	98.6		
Connecticut	13.1	2.5	82.7	98.4	2.4	83.0	98.4	8.1	73.4	97.9		
Delaware	16.7	3.9	57.4	87.0	2.7	63.2	94.4	10.0	27.1	48.3		
Dist. of Columbia	19.7	5.8	88.6	99.9	3.9	95.0	99.9	9.6	75.5	99.9		
Florida	17.7	6.8	32.3	70.2	5.3	42.7	90.2	10.3	8.4	24.2		
Georgia	21.0	7.4	18.7	61.9	6.4	24.1	87.5	8.9	10.8	24.1		
Iahe	20.0	4.5	48.4	99.5	4.6	48.4	99.5	5.5	57.6	99.1		
Illinois	14.6	3.9	65.5	99.0	3.8	65.9	99.0	7.7	50.6	97.7		
Indiana	16.1	3.5	39.6	99.6	3.3	39.9	99.6	7.7	28.1	98.7		
Iowa	16.5	4.5	44.1	99.9	4.5	44.0	99.9	3.3	55.6	99.7		
Kansas	15.7	4.3	40.9	99.6	4.1	41.5	99.7	10.1	23.8	97.9		
Kentucky	19.2	4.7	12.3	80.2	4.7	12.0	79.6	4.8	18.2	89.0		
Louisiana	21.6	7.2	27.5	62.0	5.9	32.4	83.5	8.9	30.8	32.7		
Maine	17.8	6.6	37.0	100.0	6.6	37.0	100.0	—	30.8	100.0		
Maryland	16.5	4.2	47.1	90.9	3.7	50.8	95.9	6.2	33.8	72.9		
Massachusetts	13.9	4.6	76.6	99.6	4.6	76.8	99.6	8.4	66.6	96.6		
Michigan	19.0	3.6	49.9	99.2	3.5	49.8	99.2	7.2	52.9	97.6		
Minnesota	18.1	3.1	56.9	97.3	3.0	56.8	97.4	11.5	68.5	87.9		
Mississippi	25.8	7.1	8.1	49.3	6.2	16.0	90.8	7.7	1.8	15.8		
Missouri	14.3	5.1	38.8	95.6	5.0	37.4	96.1	7.4	60.0	90.4		
Montana	19.0	3.7	62.4	97.2	3.8	62.2	98.0	3.1	65.4	85.2		
Nebraska	16.3	4.1	40.0	99.5	4.0	39.7	99.9	10.3	59.5	99.3		
Nevada	17.2	9.2	65.4	97.2	8.3	66.7	99.4	17.6	52.9	77.6		
New Hampshire	15.0	4.5	26.8	99.8	4.5	26.8	99.8	—	20.0†	100.0		
New Jersey	12.6	3.8	74.1	95.2	3.5	74.4	95.0	7.5	71.6	98.2		
New Mexico	32.8	5.0	19.5	66.5	4.5	19.0	67.6	15.9	29.2	43.4		
New York	14.3	4.0	79.8	98.2	3.8	79.7	98.2	8.0	81.1	97.6		
North Carolina	22.6	5.4	15.5	72.6	4.2	20.1	89.6	7.9	5.8	26.8		
North Dakota	17.9	4.7	43.4	92.4	4.6	42.5	92.6	6.4	66.7	87.1		
Ohio	16.0	4.6	49.8	99.8	4.4	49.8	99.8	8.5	48.5	99.1		
Oklahoma	16.3	5.2	25.9	95.1	4.7	26.0	97.5	9.9	24.9	72.2		
Oregon	15.1	4.0	70.9	99.7	4.0	71.0	99.7	5.2	63.2	94.3		
Pennsylvania	15.8	4.8	51.2	99.0	4.6	50.5	98.4	8.2	62.7	97.9		
Rhode Island	15.0	3.8	68.8	98.4	3.7	68.6	98.4	7.0	76.6	97.2		
South Carolina	21.7	7.7	11.6	52.4	5.6	20.6	89.1	9.7	3.2	17.7		
South Dakota	17.2	4.0	40.4	96.5	2.7	40.2	97.6	10.2	45.7	75.6		
Tennessee	18.0	6.1	20.4	87.2	5.3	19.8	90.8	10.5	23.8	67.4		
Texas	18.8	5.7	29.3	82.8	5.0	31.0	87.6	10.9	16.8	47.6		
Utah	24.5	3.3	55.4	98.3	3.3	55.4	98.4	6.8	61.0	93.8		
Vermont	16.5	5.7	44.5	99.9	5.7	44.5	99.9	—	.0†	100.0		
Virginia	19.2	5.4	20.0	72.8	3.8	25.2	87.2	9.4	7.6	37.7		
Washington	15.1	4.6	75.6	99.3	4.3	76.4	99.7	12.0	46.5	83.9		
West Virginia	22.6	5.0	12.5	93.9	4.9	12.9	93.6	7.4	5.4	97.8		
Wisconsin	18.3	3.6	47.5	99.0	3.6	47.3	99.1	3.7	63.8	95.3		
Wyoming	19.3	3.8	10.2	99.3	3.8	10.1	99.4	—	14.0	93.0		

* Attended by Physician

† Based on less than 25 live births

On the other hand, confinements in hospitals caring for less than 13 cases a month showed a decrease of 14.4 per cent in this period.

That this factor of increasing care in hospitals is an important one in reducing maternal mortality is indicated by the definite and intimate relationship existing between the extent of hospitalization and maternal mortality. Generally speaking the states having the highest percentage of confinements in hospitals are those with the lowest maternal mortality. I have computed for white women the coefficient of correlation between maternal deaths and the per cent of births in hospitals for the 48 states. The figure is $-.39 \pm .12$ which indicates that the result is statistically significant. The correlation would be even higher were it not for the fact that large numbers of women are rushed to hospitals in serious condition with the hope of being saved. Thus hospitals are charged with deaths of mothers for which they have little or no responsibility.

Great as the improvement of recent years has been, there is still much to be done. The number of maternal deaths in the United States is even now about 10,000 per annum. Our country is still far behind many others in safeguarding maternity. Many women still come under care too late in pregnancy. Puerperal conditions continue to be among the leading causes of death for women in the childbearing ages. Between the ages 20 and 34, puerperal deaths are outranked only by tuberculosis. But the stage is set, as we have seen, for substantial and rapid improvement. It will be helpful in this connection to know where the problem is concentrated, among which groups of people, and in what areas of the country. That should help us to know where and how to concentrate our effort—to use the rifle rather than the shotgun, as has been our custom in the

past to bring about effective results.

States vary enormously in the safety which they afford childbearing women. The maternal mortality rate in 1937 ranged from 2.5 per 1,000 live births in Connecticut to 9.2 in Nevada. Fifteen states recorded rates of 4 or less per 1,000 live births; 10 states, on the other hand, showed puerperal deaths in excess of 6 per 1,000 live births. The highest death rates are registered in the southern parts of the United States and more particularly in the southeast. In most of this large area of the country, where the birth rate is highest, the maternal death rate is still as high as the figure we deplored 25 years ago. This highly unfavorable experience is due, in large measure, to the high proportion of colored women giving birth in these states; for it is among the colored especially that the problem of maternity is still a serious one. For the United States as a whole in 1937, the puerperal mortality rate among the colored was 8.6 per 1,000 live births, or more than twice that for the white. Four states—Arkansas, Florida, Tennessee, and Texas—actually recorded maternal mortality rates among colored women of 10 or more per 1,000 live births. (See Table 2.)

I must not, however, give the false impression that the problem is now limited to a small area of the country or to one particular race. The fact is that needlessly high maternal mortality still exists very widely throughout the country and strikes various groups and races of people. The common factor, I believe, is low economic status, and particularly is this true in areas where good medical and hospital facilities are not available. This is not the time to review the statistical evidence upon which this conclusion is based. It is sufficient to say that the literature is fully convincing on that score. I do not mean to imply that we know all that we should with regard to the

effects of economic status of the family, the occupation of the mother, the type of care at confinement, and a number of other obviously important factors. Our records must be improved to enable us to make an analysis of these items on a national scale. But, generally speaking, we know that our future progress will depend upon the degree to which the newer type of medical, nursing, and hospital facilities is made available to the neglected areas and groups of people.

Personally I feel very confident that the current developments in the public health movement will carry us far and rapidly toward the goal of safeguarding maternity and infancy in our nation. Under the leadership of the federal and state health services and the various national voluntary health organizations, I can see a public more and more enlightened as to their needs and encouraged to demand the creation of the required facilities. The type of organizations and the character of the technics have been thoroughly developed in a large number of centers. These must be made more general, so that every section of the country is covered, the southeast as well as the northeast, in the service of the colored people as well as for those in the more privileged groups. The entry of the federal government into the picture is full of encouragement, for in this way the economic inequalities of the several parts of the country can and will be corrected. But even with facilities available, there will still be the problem of educating expectant mothers to take advantage of the care that is available. Intensive effort must still be made to urge mothers to seek prenatal care early in pregnancy, and to learn how to make the necessary arrangements and adjustments which will carry them through confinement safely. That will always prove to be the last and hardest job to do.

I am confident, however, that under the leadership of the medical, nursing, and public health professions, this will be accomplished. The fact is that it must be done. The time has come when, as a people, we must realize the significance of maternity in national terms. Our country has been in the red on the score of true natural increase of population for nearly 10 years. Maternity must be safeguarded. The fears must be lifted from the lives of women that they may accept the obligation of maternity gladly. We have never realized the full significance of the effect of the current dangers on the mental health of our people. We can, therefore, look to those guiding our educational and mental hygiene movements as our natural allies. There is, furthermore, the good will for the asking of every welfare and spiritual agency in the community, including the churches, women's groups, and others, provided we make it possible for them to help us. Therefore, I say the outlook is extremely promising. If the movement has been slow in developing we can now be perfectly sure that the work can be done efficiently and economically. The time has arrived when we can, with pride, look everywhere to developments which will be commensurate with the intelligence and the rich medical facilities of our people and our need for safeguarding every human life.

REFERENCES

1. Dublin, Louis I., and Corbin, Hazel. A Preliminary Report of the Maternity Center Association of New York. *Am. J. Obst. & Gynec.*, 20:877-881 (Dec.), 1930.
2. Maternal Mortality in Fifteen States. U. S. Department of Labor, *Children's Bureau Publication No. 223*. Government Printing Office, Washington, D. C., 1934.
3. *Maternal Mortality in New York City. A Study of All Puerperal Deaths, 1930-1932*. New York Academy of Medicine Committee on Public Health Relations. New York, The Commonwealth Fund, 1933.
4. Runnels, Scott C. An Obstetric Audit. *J.A.M.A.*, 13:402-408 (July 29), 1939.

Industrial Hygiene— Retrospect and Prospect*

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THIS year marks a quarter century in the history of our Section. Our silver anniversary finds us larger in number, proud of the things accomplished, and enthusiastic about the work yet to be done. We can be gratified by the fact that the accomplishments which have been made in the field of industrial hygiene are the collective contributions of personnel from all professions—physicians, engineers, chemists, statisticians, nurses, and others. We have learned that industrial hygiene is not a monopoly of any one profession, but that all of them working closely together have made progress in the attainment of our common objective.

Of late, we have come to realize that no matter where our work finds us, be it in industrial plant, insurance company, university, or official public health organization, we are primarily interested in promoting health among workers. We have also reached the conclusion that no one agency can ever hope to cope with all the problems in industrial hygiene. Although the responsibility for the health of the industrial worker rests primarily on the shoulders of state and local administrations, it is realized that a plan has to be formulated, which will include all

of the agencies interested in industrial hygiene, so that all phases of the subject will receive attention. In other words, all agencies in a locality, official and unofficial, should be marshalled in the campaign to control and prevent disease among workers.

I think we should all ask ourselves the fundamental question, "As industrial hygienists, what is our responsibility in this field of public health?" Years ago we considered our responsibility the control and prevention of accidents in industry. In the last few years our attention has been focussed on the prevention of occupational diseases. Last year,¹ in discussing the development of industrial hygiene in the United States, I called your attention to the important problem of sickness among the gainfully employed. I believe we must consolidate all the gains we have made in the control of accidents and occupational diseases and never relinquish our vigilance concerning these phases of industrial hygiene. However, we should not be satisfied with the achievements of the past, but should continue to expand our activities; the reduction of lost time due to all types of disability among workers is one such worth while activity.

I believe it most fitting at this, our first quarter century of existence, to look back on the things past, to evaluate our accomplishments, to contem-

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plate what still remains to be done, and to see if we cannot chart a future course based on present indications.

RETROSPECT

LEGISLATION

A year ago I pointed out that there were 21 states providing compensation to workers suffering from occupational diseases. During the past year, 2 states, namely, Maryland and Idaho, enacted legislation providing compensation to workers for occupational diseases. Both of these states enacted so-called "schedule" compensation laws. Arkansas, one of the two states which until now has not had any type of compensation, passed legislation this year providing benefits for injuries due to accidents and occupational diseases. Unfortunately, the law was challenged, so that 2 years must elapse before the people of the state will have an opportunity to decide whether the law should go into effect. This year Ohio amended its schedule compensation law into what is practically a "blanket" coverage occupational disease law, by the simple addition to its schedule of one more item called "any other occupational disease."

We have all known from experience that the cost of prevention of injuries caused by accidents, or by occupational diseases, is but a small fraction of the total compensation cost. Today, it is sound economics to prevent rather than to compensate for occupational diseases. Hence, it is gratifying to note that legislatures are recognizing the need for enacting laws concerning prevention. This year the legislatures of Idaho, Maryland, Utah, Montana, and Minnesota enacted laws requiring the reporting of occupational diseases to the state health department and authorizing the state health department to conduct industrial hygiene activities. The preventive features of the new law

in Maryland are of particular interest, since there is a provision that the State and Baltimore Health Departments, concurrently, receive reports of occupational diseases, study occupational diseases and ways and means for their control and prevention, and make the necessary rules and regulations for such control and prevention. Such rules and regulations shall have the force and effect of law. These health departments also have the duties to investigate industrial health hazards causing, or suspected of, causing occupational diseases, to make recommendations for the control of such conditions, and to enforce regulations regarding occupational diseases. The law also entitles the health department to recommend to the legislature for enactment such measures, including additions to the list of occupational diseases, as their studies and experience may demonstrate to be advisable.

ADMINISTRATION

Unofficial agencies—Not long ago, Dr. McConnell,² in a paper discussing the activities of independent agencies in the field of industrial health, classified them into general groups, such as private foundations and national associations, universities, trade associations, insurance carriers, industrial and mercantile establishments, and labor groups. I will not take the time to review the work of all these independent agencies, since Dr. McConnell has done it so excellently in his discussion. However, I should like to list some of these agencies and to note the contributions they have made in the field of industrial health.

The research work carried on by the Air Hygiene Foundation of America, Incorporated, whose headquarters is here in Pittsburgh, has gone a long way toward the advancement of industrial health through the study of occupational diseases. The Foundation has con-

tributed considerable material to the literature of industrial hygiene by publishing reviews and bibliographies of occupational diseases.

Such agencies as the American College of Surgeons, the National Industrial Conference Board, the National Safety Council, the American Standards Association, the American Society of Heating and Ventilating Engineers, the Illuminating Engineering Society, the National Tuberculosis Association, the Saranac Laboratory for the Study of Tuberculosis, and numerous others are taking a deep interest in the subject and have contributed considerable data. The contributions of the American Medical Association have been augmented and coördinated through the formation of the Council on Industrial Health.

Industry has for some time been very active in the field of industrial health, and of late has contributed much to the preventive phases of this problem. The National Association of Manufacturers recently appointed a committee on healthful working conditions. This committee is especially interested in bringing industrial hygiene programs to the small plants, which are in no position to carry on such a program of their own accord. Among the trade associations, the work of the American Foundrymen's Association is noteworthy. This particular agency has been active in the development of good practice codes⁸ in the foundry industry, and in the collection of data for the purpose of developing information whereby the objectives of the various codes may be achieved.

Nearly all of the insurance companies, especially those who act as compensation carriers, maintain industrial hygiene laboratories for the study of existing industrial health hazards and the means for controlling these hazards. During the last year or two, many labor organizations have increased their efforts

to promote health among their members.

I have only presented a partial list of the various unofficial agencies active in the field of industrial hygiene, but I think the lesson to be gained from all this is that the official agency in any community responsible for the protection of the health of workers cannot overlook the work of these unofficial organizations, and should develop a plan for coördinating all the activities in the community.

Official agencies—A year ago I observed that in the short period elapsing since the passage of the Social Security Act the development of industrial hygiene has been rapid. At that time, a summary of the industrial hygiene units in the various states was presented, along with the number and kind of personnel engaged in this work, and the annual budget for each unit. During the past year, several new states have undertaken industrial hygiene work, among them being Idaho, Colorado, and Utah. In addition, several large cities, such as Los Angeles, are undertaking this type of activity. I have already listed the several states whose legislatures passed laws providing for the establishment of industrial hygiene within the state health department. It is gratifying to note that some of the states actually appropriated funds for the conduct of this work, so that there is less dependence upon federal government subsidy. It should also be noted that many of the industrial hygiene units have strengthened their organizations by acquiring trained personnel and by expanding their activities.

One of the points stressed in my address a year ago was the necessity for a closer coöperation between the industrial hygiene personnel in the central organization and the various local public health units, such as city, county, or district health departments. During the past year we have seen such a

coöperative plan develop and work successfully in several of our states. It has also been possible during the past year to note progress in the plan for integration of industrial hygiene with the other health services in a community, so that public health is brought directly to all the gainfully employed in the state.

In order to illustrate how such an integrated effort can work successfully, I should like to present the activities now going on in Utah. At present, the Division of Industrial Hygiene of the National Institute of Health is conducting a coöperative study with the Utah State Board of Health, concerning the nature and extent of occupational diseases in Utah. The information so obtained will be used as a guide in the enactment of legislation for the compensation of injuries to health resulting from exposure to industrial health hazards and in the support of a permanent program designed to control such hazards. Without going into the details of the study itself, I should like to list the various health services in the State Department of Health coöperating in the investigation. For example, the District Health Officers of the areas in which the studies are being made are taking an active part in assisting the Service physicians in the physical examinations of the various workers. All serological examinations are being made by the State Board of Health laboratories. The Dental Division of the State Board of Health furnishes the services of a dentist for oral hygiene studies. The Division of Epidemiology is collecting information on the prevalence of various diseases in the communities in which the establishments being studied are located. With reference to the environmental investigation, the State Division of Engineering is assisting in the study of the working environment and is also making sanitary surveys in the communities in

which the workers live. Thus, we will have information not only on the exposures of the employees while at work, but also the conditions under which they live. It is evident that by such an integrated program public health is being practised more effectively in Utah, and industrial hygiene takes on its real meaning—that is, health promotion among workers. In all of this work in Utah excellent coöperation has been received from organized labor, industry, the medical profession, and, especially, from the Industrial Commission.

The U. S. Public Health Service has always recognized that there are other agencies in federal and state government that are concerned with industrial hygiene problems. For this reason, it has in its own relations with federal agencies striven for a joint approach to the problem and has urged a similar activity on the part of state agencies. That such arrangements in the promotion of industrial hygiene activities are sound and practicable is amply demonstrated in the official relationships which now exist in several states, and notably in such states as California, Wisconsin, North Carolina, Utah, and Rhode Island. For example, in the State of California the Industrial Accident Commission furnishes the Industrial Hygiene Service of the State Health Department with copies of all occupational diseases reportable by law to the former agency. These are investigated by the health department. In addition, the factory inspectors of the Commission call upon the Industrial Hygiene Service to make technical investigations of potential health hazards in industry. Written copies of the results of such investigations are furnished to the Industrial Accident Commission for action, since it is this latter agency which is charged by law to enforce rules and regulations designed for the protection of the health of workers. Practically identical relationships exist in Wisconsin. In this

state a physical examination program was recently organized by the Industrial Commission in collaboration with the Industrial Hygiene Division of the Wisconsin State Board of Health.⁴ This plan appears to be an excellent approach to medical control of industrial health hazards which, coupled with engineering control, should go a long way in the prevention of industrial diseases.

Last year, I also emphasized the importance of supplementing our present information on occupational diseases and accidents with a knowledge of absenteeism with respect to frequency, duration, and cause in each numerically important occupational group in a working establishment. At that time it was indicated that such data will serve to reveal to the management and the public health worker the type of action which should be taken to obtain the maximum reduction in the amount of time lost from work on account of disability. Although in the short time which has elapsed it is not possible to present any specific statistics, it is gratifying to state that one large industrial concern, employing several hundred thousand workers, has inaugurated a plan of reporting occupational morbidity. In addition, several states have also undertaken this activity in coöperation with industry. To assist in collecting such data, the Division of Industrial Hygiene of the National Institute of Health has developed a simple report card, which can also be used as a punch card for the analysis of the reports, and has prepared a manual indicating how the data should be collected and recorded.

In inaugurating industrial hygiene programs the various states and cities first undertook to define the problem in each locality. This definition was attempted through the medium of the industrial hygiene survey of potential exposures and by an evaluation of pres-

ent health services in industry. Today, practically all of the states engaged in industrial hygiene work have completed these surveys and are now actively engaged in controlling the health hazards revealed by these studies. The Division of Industrial Hygiene of the National Institute of Health is at present completing a summary of the various state surveys and will soon publish information on the exposure of approximately 1½ million workers in 17,000 plants to various materials and conditions of public health significance. Preliminary data show that only one-fourth of the workers in these plants had the services of a full-time safety-director, and that only 15 per cent of the workers were provided with a plant physician, and about one-third had the services of a full-time plant nurse. One interesting finding with reference to present health service facilities in these 17,000 plants deals with sickness records. The survey data show that nearly half (45.4 per cent) of the workers were in plants maintaining sickness records, indicating that some information on the extent of so-called "non-occupational" illnesses in industry is at hand.

With reference to the exposure of these workers to various materials and conditions of public health significance, it was possible to estimate the number of workers which could be expected to be exposed in all United States industry. For example, nearly 1½ million people are exposed to the hazards from carbon monoxide gas and ¾ million persons to lead and its compounds. Slightly more than 1 million persons are exposed to the inhalation of silica dust, while the most frequent exposure is to agents capable of causing dermatitis.

Some information was also obtained on the control measures now being employed with reference to some of these exposures. For example, in connection

with silica dust, 93,244 persons were found to be exposed, and of this number 14 per cent of the workers were provided with local exhaust ventilation. Wet methods were frequently employed, and so were respirators. Although the degree of protection afforded by these various measures was not evaluated at the time of the survey, still we have an indication of the extent to which steps have been taken to ameliorate conditions, and from the brief data presented it appears that much needs yet to be done in this field.

Two years ago, the various individuals engaged in industrial hygiene activities in government services banded together to form the National Conference of Governmental Industrial Hygienists.⁵ The objects of the Conference are to promote industrial hygiene in all its aspects and phases, and to co-ordinate such activities in official federal, state, local, and territorial organizations. This organization has been instrumental in encouraging the interchange of experience among industrial hygienists in such official organizations. In April of this year, the second annual Conference was held, of which an entire day was devoted to reports from 11 committees. To give one an idea of the work being undertaken and actively pursued by this Conference, I should like to list the various committees which reported this year and which have been actively continued. One committee is engaged in the study of methods in appraisal of industrial hygiene problems in the localities, while another is concerned with the relationship of industrial hygiene activities to industry, labor, the medical profession, and other agencies. There is a committee on technical standards and this committee has been organized into several sub-committees. A committee on industrial hygiene education also reported, while the committee to study methods of securing effective and uni-

form reporting of occupational diseases and other illnesses among workers was able to contribute substantially to this subject. Other committees are those dealing with administrative development of industrial hygiene in the state through local departments of health, a committee on industrial health codes, one on the study of industrial hygiene legislation, and a committee on industrial hygiene personnel. And, finally, a committee was organized to develop a standard system of reporting industrial hygiene activities.

In connection with some of the well established public health functions, suitable forms for recording progress have been developed and found practicable. No such established technique has been developed for industrial hygiene, since it is only in the last two or three years that our various state health departments have become active in this field. Without going into a discussion of what constitutes a satisfactory report of accomplishments or progress at this time, suffice it to say that after deliberate study some simple forms were developed to be used as a starting point for the recording of activities and achievements. In developing these forms it was kept in mind that a state industrial hygiene program is essentially concerned with application of research and certain educational functions. In considering the work of an industrial hygiene division, experience has shown that services are rendered because of requests, because of a long range program, and as a result of reports of morbidity which may be made to the health agency. The forms to record such information have recently been given a trial and appear to work satisfactorily. In fact, these forms have the advantage of calling to the attention of the industrial hygiene administrator some of the shortcomings of the program.

At this point mention should be

made of a few of the accomplishments in our newly formed industrial hygiene units. In one state, functioning on a limited budget of \$10,000, and with only the services of 1 physician and 1 engineer, it was possible to control silicosis and other dust hazards effectively in the granite, slate, talc, and asbestos industries in that state. All this was made possible by the active participation and coöperation of industry and labor. As a result of these combined efforts more than \$100,000 worth of dust control equipment has been installed in various granite cutting sheds in this state, and approximately \$25,000 has already been spent for the control of the dust hazard in granite quarries. As a result of the efforts of the work of this small unit it may be truthfully said that the dust hazard has been controlled for nearly 4,000 workers in this state. This is, indeed, a worthy achievement.

In another state, several thousand physical examinations of workers in dusty trades brought out many defects in health among the workers, and steps were taken for the correction of these physical defects. In addition, the control of the working environment contributing to some of these ailments was also effected. In still another state many industries were investigated and as a result of some of these studies, approximately 5,000 persons may now be said to be working under more healthful conditions. In one of our New England states routine investigations were made in plants housing several thousand individuals and improvement made in the working environment, so that health hazards were eliminated. Furthermore, studies as a result of a planned program were also undertaken and remedial measures instituted. In the foundry industry in this state approximately \$300,000 were expended for control measures as a result of recommendations made by the industrial

hygiene unit. All told, some 14,000 persons were in these industries, so that working conditions for these people are now greatly improved. This particular industrial hygiene unit also carried on an extensive consultation service on numerous industrial hygiene topics.

So far I have sketched for you two of the features of an industrial hygiene program, namely, that of application of research and educational activities. I have said nothing about the first part of such a program, that is, fundamental research. Those of you who have been following the literature on the subject of industrial hygiene, have probably noticed the tremendous amount of information now being published in the field of industrial hygiene. These contributions come to us from industry, insurance companies, universities and governmental agencies. The industrial hygiene building of the National Institute of Health was recently completed, so that all of the activities in industrial hygiene of the U. S. Public Health Service are now together. It is hoped that with the states carrying more of the burden of the preventive phases of industrial health, the Service will have more time to devote to research.

In closing this brief and incomplete summary of some of our accomplishments, I should like to state that we have gone far in the field of medical control, in toxicology, and in engineering control of health hazards in industry. There was a time when all discussions of engineering control of occupational diseases were always prefaced by the remarks that there is a paucity of data on the subject. Today, we can proudly say that we have accumulated a considerable amount of information in the last four or five years. This body of information is being applied successfully in many of our states, and today we feel confident that there are really very few exposures which are impossible of control.

PROSPECT

Although it has been very gratifying to discuss the various achievements in industrial hygiene in the last year or two, we must not think that we can rest upon our laurels. Industrial hygiene, as a special field in public health, is relatively in its infancy. Although we can truthfully say that the lag between the knowledge of how to control industrial health hazards and the degree of success in applying this knowledge is rapidly diminishing, much still remains to be accomplished.

In discussing prospects in industrial hygiene, no attempt will be made to paint a glowing picture of the future in this field, but to indicate briefly some of the problems confronting us and what may be done to solve them.

One of the primary needs today is a sufficient number of trained personnel. It is important, therefore, that institutions for teaching of industrial medicine and the methods employed in the engineering control of health hazards in industry be organized as quickly as possible. The Division of Industrial Hygiene of the National Institute of Health has attempted to overcome the lack of trained personnel by presenting brief courses in industrial hygiene and by arranging for in-service training in the various state units for the personnel now entering the field. These measures are merely stop-gaps and not very satisfactory, so that serious consideration should be given by some of our schools of public health and medical schools to developing a course in industrial hygiene.

All of the states now engaged in industrial hygiene activities spend approximately $\frac{3}{4}$ million dollars. It is evident that with the numerous problems confronting these various units, this is far too small a sum and that more money will have to be appropriated for this work. In addition, our observations and reports which we re-

ceive from the various states indicate that there is a lack of trained personnel to carry on the various activities. For example, one of the problems which confront most of the states is the reporting of occupational diseases and other illnesses. In some of the states the reporting is now much better than it was. In one state, for example, some 5,000 reports of occupational diseases were sent in to the state health department last year. However, but a small number of these reports were investigated, since no personnel was available for the all-important follow-up work. I believe we should all strive to increase our budgets and our personnel and that the various legislatures in the states be urged to appropriate sufficient funds to carry on this important activity in a manner commensurate with its importance.

Mention has already been made of the active interest on the part of industry in the field of industrial hygiene. After all, corrective measures in industry are accomplished by private effort and private funds. The important task for any industrial hygiene administration is to persuade industry to solve its own health problems. The official agency mainly serves in aiding industry to evaluate its problems, suggests ways and means for their control, develops standards of good practice, furnishes technical guidance, and conducts educational programs. Industry has not been slow in accepting its share of the responsibility and is coöperating with official agencies. Recently, through the American Association of Industrial Physicians and Surgeons, a committee was organized to study present industrial hygiene facilities in representative industrial establishments for the purpose of evaluating these facilities and developing standards which would serve to expand and improve present programs.

The question of good practice codes

has received attention of late among our trade associations and state industrial hygiene units. A good practice code for the elimination of a hazardous condition in an industry should do more than set forth the desirable conditions under which work may be carried on, but should also instruct the management as to how these desirable conditions may be achieved. An example of the latter type of code is the U. S. Public Health Service milk ordinance and code. This particular publication contains a 13 page ordinance while the code itself, which gives the information as to how the desirable items of the ordinance may be complied with, consists of nearly 100 printed pages. The codes of the American Foundrymen's Association are excellent examples of what may be done to aid management to clean house and provide a safe and healthful working environment. More such codes are greatly needed.

I have already mentioned the trend today in industrial hygiene, showing that more and more local health organizations are beginning to participate in this important field of public health and I have also indicated how the industrial hygiene program in a state can be integrated with other health services in a health department, with other governmental agencies, medical organizations, labor, industry, and nonofficial agencies. I would urge all public health administrators to consider seriously this important phase of the program and to do all that is possible to devise a plan which will coördinate the activities of all the agencies interested in, and responsible for, industrial hygiene in their communities.

Our problems in industrial hygiene will be constantly increasing rather than diminishing, in spite of all our efforts in the field. This is largely due to the fact that added responsibilities are given to administrators due to a variety of causes. With increased

mechanization in industries, with the use of old and new chemical compounds in many of our processes, the responsibilities given us by legislation, and those which might be added in case of war, all of these factors, and many more too numerous to mention, will add greatly to the burden of industrial hygienists in the future. I believe that all of us should have our programs so planned as to be able to meet these exigencies as they arise.

So far I have been discussing the prospect of industrial hygiene from the administrative point of view. There are, of course, many technical problems which are also in need of solution. In the field of personal hygiene we are greatly in need of more sensitive methods of diagnosis and we are especially in need of tools which will enable us to detect incipient cases of disease before real damage occurs. In the environmental field we have made great strides in developing more precise sampling instruments and more precise methods of analysis, as evidenced by the papers to be presented here this week. However, as our increased engineering knowledge enables us to control environmental conditions to a point where only small amounts of toxic materials remain in the air, it will be necessary to develop more precise sampling and analytical methods so that we can detect these minute amounts. One could, of course, argue that our present methods enable us to detect the so-called threshold limits, so that we need not worry about finding materials below this toxic limit. However, most of these limits are merely tentative, and increased medical knowledge may show that our standards today may be far too dangerous tomorrow. For that reason we should continually strive to improve our sampling and analytical technics in engineering control of industrial health hazards. This Section has a committee on Chemical

Procedures in Air Analysis and yesterday we heard an excellent report on the work in progress. It is hoped that research can be developed on the subject of chemical procedures in the determination of toxic materials in industry, and that as a result of such research and the work of this committee and others, a handbook on standard methods may be developed.

I have attempted to sketch briefly some of our accomplishments and a few of the problems and needs in industrial hygiene. I think we can be heartened by the actual progress made and the prospects before us. The members of this Section have made important contributions for the past 25 years to the administrative and technical phases of industrial health and I am convinced that we must continue to meet the challenge of new responsibilities, and I am sure that we will do so. Industry is cognizant of the fact that it pays to control and prevent industrial health

hazards. Labor is now sufficiently well informed, organized, and articulate to demand safer and more healthful working conditions. We have at hand the tools and the information necessary for creating healthful working conditions and for improving the health of workers. It seems to me that under such favorable conditions we should all strive for the goal before us so that we can bring positive health to the industrial worker.

REFERENCES

1. Bloomfield, J. J. Development of Industrial Hygiene in the United States. *A.J.P.H.*, 28, 12 (Dec.), 1938.
2. McConnell, W. J. The Activities of Independent Agencies in the Field of Industrial Hygiene. *J.A.M.A.*, 112, 7:645 (Feb. 18), 1939.
3. *Tentative Codes of Recommended Practices for the Foundry Industry*, A.F.A. Industrial Hygiene Codes Committee, 1938-9, Chicago.
4. *Wisconsin Physical Examination Program*. Industrial Commission of Wisconsin, Madison, Wis., 1939.
5. *Transactions of the First Annual Conference of Governmental Industrial Hygienists*. Published by the Division of Industrial Hygiene, National Institute of Health, Bethesda, Maryland.

Professional Training Courses

DR. C. C. P. ANNING, Medical Officer of Health for Benoni, South Africa, referring to the content of university courses for professional training in public health says, "The public health courses . . . include much study in sanitary details about air pollution and plumbism, leprosy and tapeworm infection, yet no time at all is given to sociology, to economics, to social psychology or social anthropology, subjects which form an essen-

tial background to the work of the health officer today. There is no training given even in the art of health education, though perhaps it is felt that anyone with an ounce of bounce can put health education across.

As Sir Stephen Tallents said the other day, 'There is an idea that publicity is a sloppy kind of business that requires little forethought, little planning, little pains and little organization.'

Sylvatic Plague*

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THE Executive Committee has held no meetings. No problems were submitted for consideration. In fact, it is apparent that without further more accurate knowledge relative to the epidemiology of plague infections in rodents, no more significant and effective suppressive measures than those in use can be devised. An informative statement relative to diseases of rodents has been mimeographed, and at least 500 copies distributed throughout the state of California as well as a limited number in other states. As a whole, the pamphlet has been well received and has not aroused the reaction among chambers of commerce which had been predicted. Vacationists and hunters are quite familiar with the inherent dangers of exposure to rodents. Judicious publicity in the form of talks and in the daily press keeps the layman well informed and continuously in touch with the progress of the various findings.

EPIDEMIOLOGICAL OBSERVATIONS DURING 1938 AND THE FIRST HALF OF 1939

Again the Committee on Sylvatic Plague has collected, in coöperation with the State Health Officers and Dr. C. R. Eskey of the U. S. Public Health Service, statistical data concerning the

extent of human and rodent plague. The pertinent data may be summarized as follows:

I. HUMAN PLAGUE

No human cases of plague have been recognized or reported. In this connection it is worth noting that several reports and laboratory observations attest to the beneficial effect of prontosil or sulfapyridine in the treatment of human plague infections. Carman (1938) reported from East Africa the administration of prontosil in 6 cases, 3 of which recovered. Vine (1938) in a small epidemic in the Nilgiris treated 3 cases and all recovered. In the experiments of Schütze (*Lancet*, Feb. 4, 1939, p. 266) sulfapyridine proved to be the most efficacious of the newer preparations in chemotherapy of *Pasteurella pestis* infection of rats and mice.

II. RODENT PLAGUE (ANATOMICAL AND CLINICAL) AND INFECTED FLEAS COLLECTED FROM WILD RODENTS

The data pertinent to the survey activities are summarized in Tables I and II. The committee is indebted to E. T. Ross, California State Department of Public Health, for the summary in Table I and to Dr. C. R. Eskey for the report which is reviewed and condensed in Table II.

* Fourth Report of the Chairman of the Sylvatic Plague Committee of the Western Branch American Public Health Association. Read before the Tenth Annual Meeting in Oakland, Calif., July 23-28, 1939.

In California the collection and autopsy of 10,863 rodents in 301 different areas yielded 6 *C. beecheyi* squirrels with anatomical markings indicative of plague. It is of interest to note that for the first time since the existence of plague has been recognized through the appearance of human cases or the demonstration of fleas infected with *P. pestis*, grossly diseased squirrels were found in two counties. El Dorado County on the shores of Tahoe region, proved to harbor plague through one human infection in 1936 and another in 1937, produced 2 such squirrels.

In 1933 San Bernardino County was suspected of being a sylvatic plague area, but annual surveys yielded only infected fleas until in 1938 when 4 Fisher squirrels with definite plague lesions were found. Again the injection of squirrel organs into guinea pigs in the form of pools was proved valuable. The number of rodents included in a pool varied from 5 to 12 in the 6 collections which proved to be infected

with *P. pestis*. The advantages of examining fleas collected from apparently healthy squirrels is equally attested by the demonstration of infected vectors in 17 collections. Thus the surveys disclosed 16 new areas as sylvatic plague foci. The existence of latent plague in golden mantled squirrels in Plumas County has been established.

In 1939 an old focus in Ventura County showed renewed activity. Three young Beecheyi squirrels with enormous splenic tumors, and no buboes or other markings were proved to be the victims of an acute plague septicemia. Infected fleas have recently been found in Contra Costa County.

If one surveys with an open mind the enormous amount of work so faithfully carried out by the survey crews, and evaluates the benefit derived from these efforts, one wonders if the time has not arrived to review and re-orient the procedures. That sylvatic plague exists in California and is widely distributed, is now an established fact.

TABLE I

California Counties in Which Plague Was Demonstrated During 1938

Plague Demonstrated in 30 Specimens as Follows:

County	Individual Rodents	Pools of Rodents	Rodents in Pool	Pools of Fleas	Fleas in Pools	Number of Foci	Totals Collected	
							Rodents	Fleas
El Dorado	2	..	..	2	26	3 (new)	937	1,053
Fresno	..	2	12	2	91	3 (new)	5,004	12,730
Plumas	..	1	10	..	..	1 (new)	237	163
San Benito	..	1	10	2	394	2 (new)	965	8,429
San Bernardino	4	1	5	6	361	7 (new)	2,301	4,378
Santa Clara	..	..	..	1	75	1 (old)	726	4,758
Santa Cruz	1	1	5	4	136	3 (old)	693	4,226
	7+	6+	42	17+	1,083	20	10,863	35,737

Other Counties Surveyed

Alameda, Contra Costa, Kern, Lassen, Los Angeles, Madera, Mariposa, Monterey, Marin, Merced, Placer, San Mateo, San Luis Obispo, San Joaquin, Stanislaus, San Francisco, Sonoma and Tulare

Rodents collected 16,172
Fleas collected 69,114

TABLE II

Plague Infection of Wild Rodents Demonstrated at the U. S. Public Health Service Laboratory, San Francisco, January, 1938 to June 30, 1939

State	County	Date	Species of Rodent	Positive Inoculations for Plague				Total Positive Inocula- tions for Plague
				Fleas	Lice	Ticks	Tissue	
Arizona	Apache	9/38	<i>Cynomys gunnisoni zuniensis</i>	1	1
Idaho	Bannock	5/38	<i>Citellus armatus</i>	2	2	10
	Bannock	6/38	<i>Marmota flaviventris</i>	1	..	..	..
	Bear Lake	5/38	<i>Citellus armatus</i>	3	..	..	1
	Fremont	6/39	<i>Citellus armatus</i>	1	..	..	..
Montana	Beaverhead	6/38	<i>Citellus richardsonii</i>	1	1	4
	Gallatin	5/38	<i>Citellus elegans</i>	2	..	..	..
Nevada	Clark	4/38	<i>Neotoma fuscipes mohavensis</i>	10	13
	Clark	4/39	<i>Neotoma desertorum</i>	3	..	..	..
New Mexico *	Catron	8/38	<i>Cynomys gunnisoni zuniensis</i>	13	9	25
	Catron	8/38	<i>Peromyscus truei</i>	1	..	..	..
	Catron	8/38	<i>Citellus grammurus</i>	1	..	..	..
	Dona Ana *	4/38	<i>Dipodomys ordii</i> (kangaroo rat)	..	..	..	1
Oregon	Baker	4/38	<i>Citellus oregonus</i>	2	2	14
	Grant	5/38	<i>Citellus oregonus</i>	4	..	..	1
	Grant	5/39	<i>Citellus oregonus</i>	..	..	..	..
	Union *	4/38	<i>Citellus oregonus</i>	..	..	..	2
	Wallowa	6/39	<i>Citellus columbianus</i>	1	..	..	2
Utah	Kane	5/38	<i>Neotoma desertorum</i>	1	4
	Rich	1938	<i>Citellus armatus</i>	2	..	..	..
	Wasatch	6/38	<i>Citellus armatus</i>	..	..	..	1
Washington	Adams	3/38	<i>Citellus washingtonii</i>	10	1	..	1	23
	Adams	4/39	<i>Citellus washingtonii</i>	..	..	..	..
	Lincoln	4/38	<i>Citellus washingtonii</i>	7	..	..	2
	Lincoln	4/39	<i>Citellus washingtonii</i>	..	..	..	..
	Lincoln	5/39	<i>Sylvilagus N. nuttallii</i>	..	..	..	1
	Spokane *	6/39	<i>Citellus columbianus</i>	..	..	..	1
Wyoming *	Lincoln	1938	<i>Citellus armatus</i>	20	2	2	15	53
	Lincoln	1938	<i>Citellus elegans</i>	4	1	..	..
	Lincoln	1938	<i>Marmota flaviventris</i>	1	..	..	..
	Sublette	1938	<i>Citellus elegans</i>	2	..	..	..
	Uinta	6/38	<i>Citellus elegans</i>	1	..	..	..
	Uinta	6/39	<i>Citellus armatus</i>	1	..	..	1
	Uinta	7/38	<i>Cynomys leucurus</i>	3	..	..	..
Total positive animal inoculations				98	4	2	43	147

* New infections

Furthermore it is equally recognized that it may appear in epidemic proportions any time and anywhere in the state provided certain conditions, as yet inadequately understood, are conducive to an increased distribution of the infective agent. How to prognosticate the occurrence of these epizootics with their inherent dangers to man is a complex problem which requires field investigations and analysis by diverse groups of mammalogists and entomologists.

It has been repeatedly emphasized that sylvatic plague is everlasting and that the available knowledge suggests

continuous vigilance in preventing contact of the rat population with the diseased wild rodents. In California this type of suppressive work has been effectively carried out by the State Department of Agriculture. At least 3,700,000 acres in which sylvatic plague has been demonstrated have been treated with poison grains, carbon bisulphide and miscellaneous materials. The estimated cost of ground squirrel suppression during a year, for all purposes and agencies, is \$614,000. The outlay of WPA funds approximates \$58,500. It is to be hoped that the advantages gained may be maintained by slightly

lessened activities. However, experience has taught that with the present-day knowledge, little permanent effect may be anticipated. Here again, more research is doubtless needed in order to accomplish the desired protection without the expenditure of large sums of money.

The survey activities by the U. S. Public Health Service as shown in Table II have disclosed a number of significant facts:

1. Sylvatic plague exists now in 10 of the 11 states. In 1938 it has conclusively been demonstrated in various epizootics of prairie dogs and squirrels (fleas) in Arizona, New Mexico, and Wyoming. Thus sylvatic plague has crossed the Continental Divide and the possibility of extension in the Rio Grande deserves continuous observation.

2. Extension into new counties has been observed in Idaho, Montana, Oregon, Utah, and Washington. It is significant that in a few instances the presence of sylvatic plague announced itself in the form of epidemics of the

rodents with a notable mortality, and thus attracted the attention of the representatives of the Biological Survey. The splendid coöperation offered by this service to the sylvatic plague studies deserves special comment.

3. New species of rodents such as kangaroo rats (Mexico), cottontail rabbits (Washington), and the pack rats of the desert area of Nevada have been found as hosts of *P. pestis*.

4. The collection and inoculation of guinea pigs with pools of fleas, lice, and ticks has again yielded more information than the examination of the carcasses of rodents shot or trapped. If one excludes from consideration the tissue examinations made on dead or sick rodents collected in actively epidemic areas (New Mexico, Washington, and Wyoming), the benefit derived from these tests appears definitely limited. Without mass inoculation of fleas sylvatic plague surveys cannot be considered modern. Although the majority of health officers accept the demonstration of infected fleas removed from healthy rodents as *de jacie* evi-

TABLE III

Rodents Known to Suffer from Spontaneous Plague

Sciuridae	Washington ground squirrel	<i>Citellus Washingtonii</i> (Washington)
	Richardson's ground squirrel	<i>Citellus Richardsonii</i> (Montana)
	Wyoming ground squirrel	<i>Citellus Richardsonii elegans</i> (Wyoming, Montana)
	Uinta ground squirrel	<i>Citellus armatus</i> (Idaho, Utah, Washington, Wyoming)
	Oregon ground squirrel	<i>Citellus beldingi oregonus</i> (California, Oregon)
	Columbia ground squirrel	<i>Citellus columbianus</i> (Oregon, Washington)
	Say's rock squirrel	<i>Citellus variegatus grammurus</i> (Utah)
	Beecheyi ground squirrel	<i>Citellus beecheyi</i> (California)
	Fisher's ground squirrel	<i>Citellus beecheyi fisheri</i> (California)
	Yellow bellied marmot	<i>Marmota flaviventris englehardii</i> (Utah, Montana, Wyoming)
		<i>Marmota flaviventris nosophora</i>
	Utah prairie dog	<i>Cynomys parvidus</i> (Utah)
	Prairie dog	<i>Cynomys leucurus</i> (Wyoming)
	Prairie dog	<i>Cynomys gunnisoni zuniensis</i> (Arizona, New Mexico)
	Tahoe chipmunk	<i>Eutamias quadricinctatus frater</i> (Aller) (California, Nevada)
Mericidae	Golden mantled squirrel	<i>Callospermophilus chrysodeirus chrysodeirus</i> (California)
	Sierra Nevada chickaree	<i>Sciurus douglasii albolimatus</i> (California)
	Sierra Nevada flying squirrel	<i>Glaucomys sabrinus luscivus</i> (Bangs) (California)
		<i>Peromyscus truei Gilberti</i> (California, New Mexico)
	Gilbert white footed mouse	<i>Neotoma cinerea occidentalis</i> (California)
	Western Bushy-tailed woodrat	<i>Neotoma lepida intermedia</i> (California)
	Intermediate woodrat	<i>Neotoma fuscipes mahavensis</i> (Nevada)
	Mohave woodrat	<i>Neotoma desertorum</i> (Nevada, Utah)
	Desert woodrat	
Heteromyidae	Kangaroo rat	<i>Dipodomys ordii</i>
Leporidae	Cottontail rabbit	<i>Sylvilagus nuttallii</i>

dence of the existence of sylvatic plague in the area, there is still some hesitancy on the part of others to accept this interpretation. The committee has already expressed its opinion in 1937 and again in 1938 in the sense that the recognition of either infected rodents or fleas constitutes conclusive proof of the presence of sylvatic plague in the respective area and that control measures must be applied to this particular region.

A survey concerning sylvatic plague was undertaken in 1938 in the Province of British Columbia in coöperation with the Provincial Department of Health and the Dominion Department of Pensions and National Health. The survey activities covered examination of *Citellus columbianus* and *Marmota flaviventris avara*. The inoculation of tissues and pools of fleas yielded negative findings for *P. pestis* on guinea pigs. Thus no sylvatic was discovered. Similarly rat collections in Vancouver and New Westminster were made. The total flea index was 0.91. A high percentage, 98 per cent, of *Rattus norvegicus*, was observed. *P. pestis* was not discovered in any of the tissues or flea specimens submitted for examination.

In view of the survey studies made throughout the Western States since 1908 and particularly since 1934, the rodents listed in Table III are known to suffer from spontaneous plague.

III. SCIENTIFIC INVESTIGATIONS

1. *Vector efficiency and plague transmissions*—Dr. C. R. Eskey has continued his studies on the transmission of plague by fleas from wild rodents. He has been able to infect 26 species of wild rodent fleas with plague transmitted by bites of 13 species found on wild rodents. These fleas included nearly all of the common species encountered in the West.

2. The fleas on prairie dogs in

Arizona and New Mexico have been studied by William L. Jellison. Three closely related species—one new one, *Opisocrostitis tuberculatus cynomysus*—have been identified. In several localities the prairie dogs were heavily infected with human fleas.

3. William L. Jellison of the Rocky Mountain Laboratory, U. S. Public Health Service, has studied the possible relationship of flesh-eating birds to the epidemiology of sylvatic plague in Montana. He found that predatory species may serve as accidental hosts of rodent fleas. In particular the burrowing owl (*Scototyto cannicularia*) deserves consideration. Certain forms of predatory birds fed plague-infected guinea pig tissues were consistently infectious, while a few species fed plague tissues were non-infective.

4. Under the guidance of Drs. T. I. Storer, M. A. Stewart, and C. M. Wheeler, a field crew of 2 to 3 men appointed by the State Department of Public Health has collected data concerning the activities of rodent species (particularly *Citellus beecheyi*) and the distribution of flea species. Trapping operations were initiated at Bass Lake, Madera County, in order to obtain information which may be of value in the planning of suppressive measures relative to recreational areas. The observations covering one year are being analyzed.

5. Studies on the host-parasite relationship to *P. pestis*, the susceptibility and immunity of Beecheyi and Richardson squirrels, and investigations on the vector-parasite cycle are in progress at the new sylvatic plague laboratory of the George Williams Hooper Foundation, University of California, endowed by the Rosenberg Foundation. Although the investigations are in active progress it is worth noting that in some series only 50 per cent of the squirrels trapped in regions not proved to be plague infected succumbed to intra-

cutaneous injections of from 9-23,000 *P. pestis*.

Attention is called to the following literature:

1. Howell, Arthur H. Revision of the North American Ground Squirrel. *North American Fauna*, No. 56, U. S. Dept. of Agri., Apr., 1938.
2. Barona, Jose Maria de la, and Corica, Pablo.

Rural Plague in Argentina. *Folia biologica*, 83-84: 355 (Feb.-Mar.), 1938.

3. Kalabukhov, N. I., and Reevskij, V. V. Ecological Peculiarities of the Ground Squirrel at Different Periods of Its Annual Life Cycle. *Revue de Microbiologie d'Epidemiologie et de Parasitologie Saratov*, 15, 1:109-130, 1936.

4. Rosier, A. J. Plague Campaign in Java for 1935. *Mededeel. v. d. dienst. d. volksgezondh. in Nederl.-Indië*. No. 26, 1937.

5. Stewart, M. A., and Mackie, D. B. The Control of Sylvatic Plague Vectors. *Am. J. Hyg.*, 28:469-480, 1938.

CHRISTMAS SEALS



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Types of Tubercle Bacilli in Lesions of Garbage-Fed Swine

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THE feeding of garbage to swine is a fairly common practice that is justified in most instances by: (1) being a practical and expedient manner for the disposal of unused food or food that is unsuited for human consumption, and (2) by being an economical source of food for the feeding of swine. It is obvious, of course, that the indiscriminate collection of garbage and feeding it to swine in an uncooked state provides opportunity for the transmission of certain bacterial and parasitic diseases.*

There are available several reports in which human tubercle bacilli have been recovered from the tuberculous lesions of swine that had been fed uncooked garbage. There are, however, comparatively few reports as to the frequency of the different types of tubercle bacilli responsible for lesions of tuberculosis in garbage-fed swine. That data might be secured concerning this problem as it exists in a large metropolitan area, a study was made of material obtained from one of the abattoirs in South St. Paul.

MATERIAL AND METHODS

Only swine that were definitely known to have been fed garbage were included in the study. The identity of such animals was ascertained at the time of purchase by the management of the abattoir and consequently it was possible to slaughter the animals separately from the "regular kill." This procedure facilitated the post-mortem examinations by the federal meat inspectors who collected the specimens subsequently utilized for laboratory examination. Attempts to secure information as to the origin of the garbage fed to the swine were unsuccessful.

The 11 lots of swine were slaughtered over a period of approximately 4 months. No selection of the lots of swine included in the study was exercised. All garbage-fed swine presented for slaughter during the period of the investigation were included in the study.

The 11 lots of swine comprised a total of 264 animals. By the usual careful post-mortem examination 75, or 28.4 per cent, of the carcasses were considered by the meat inspectors to contain gross lesions of tuberculosis. The lesions in practically all instances were classified as "slight" with the disease limited to the lymph nodes of the head and neck or the mesentery. The tissues obtained from the 75 swine

* Many of the problems associated with the feeding of garbage to swine have recently been presented by Germanio. In Canada the feeding of swine with garbage, swill, meat scraps, offal, or vegetable refuse, either raw or cooked, obtained elsewhere than on the premises where fed, is prohibited unless a license has first been obtained from the Veterinary Director General.¹⁴

that were considered at necropsy to be tuberculous may be briefly summarized as follows: mesenteric lymph nodes from 27 swine, submaxillary lymph nodes from 19, cervical lymph nodes from 14, portal lymph nodes from 1 hog. In 14 specimens from 14 swine the anatomic situations from which the lymph nodes were obtained were not designated. In all cases except 2 only one specimen was received from each carcass. In 2 cases both a submaxillary and a mesenteric lymph node were received, but only the mesenteric nodes were utilized.

The character of the lesions presented by the respective lymph nodes was as follows: multiple caseous abscesses 48; caseocalcareus 16; single caseous 6; hyperplasia with minimal necrosis 1. Lymph nodes from 4 cases failed to show definite gross evidence of disease. Most of the lesions were small and many appeared to have been of recent origin. All of the caseocalcareous lesions showed variable degrees of encapsulation and some peripheral fibrosis was noted in many of the lesions that were caseous.

The respective specimens were forwarded to the laboratory in dry borax, each specimen in a separate container. When received, the tissues were immersed in boiling water for 5 to 10 seconds to remove the borax and to reduce the possibility of extraneous contamination. A portion was removed for subsequent histologic study and the most likely portions of the rest of the material were emulsified in sterile sodium chloride solution.

The respective emulsions were used to prepare cultures; both glycerinated and nonglycerinated egg-yolk agar mediums being used.* For the elimination of other than mycobacteria that might be present, those portions of the respective emulsions that were cultured

were treated with 5 per cent oxalic acid as suggested by Corper and Uyei. The amount of emulsion used for culture was 2 cc. After preparing the emulsions as described in detail elsewhere 8 slants of medium—4 glycerinated and 4 nonglycerinated—were inoculated and incubated at 37.5° C. for a period of 10 weeks unless positive results occurred sooner.

Each emulsion prepared from the respective lymph nodes was used also to inoculate two guinea pigs subcutaneously, each animal receiving 1 cc. Unless dying before, the guinea pigs were maintained for 8 weeks, when they were killed for necropsy.

In these instances in which acid-fast bacteria were not obtained in culture before the guinea pigs injected with portions of the same emulsion died or were killed, the spleen of one or of both guinea pigs was cultured for tubercle bacilli, whether or not lesions of tuberculosis were discernible.

After cultures had been obtained either direct from the original material or from the spleens of the guinea pigs, the physical character of the different bacterial strains was noted and the bacillary type of each culture determined by the injection of two additional guinea pigs and two rabbits. The dose used in most instances was 0.01 mg. The guinea pigs were injected subcutaneously and the rabbits intravenously. The period of observation for the guinea pigs was 8 weeks; for the rabbits 90 days.

RESULTS

The results of the investigation are summarized in Table I. As may be noted, tubercle bacilli were demonstrated and cultures eventually secured in 47 of the 75 lesions obtained for study. When the 47 strains were typed to distinguish the bacillary type of the respective cultures, 12, or 25.5 per cent, proved to be of the human type while

* The medium was originally described by Capaldi and more recently by Herrold.

TABLE I

Summary of Results of Study to Determine Types of Tubercle Bacilli in Lesions of Tuberculous Garbage-fed Swine

Lot	Number of Swine	Retained for Tuberculosis	Tubercle Bacilli Demonstrated	Type of Tubercle Bacilli *	
				Human	Avian
1	32	12	8	6	2
2	24	7	5	3	2
3	27	4	3	0	3
4	23	4	4	0	4
5	26	5	1	0	1
6	16	9	5	0	5
7	21	5	1	0	1
8	30	8	7	0	7
9	13	5	5	3	2
10	21	4	2	0	2
11	31	12	6	0	6
Totals	264	75	47	12	35

* Type determined by tests of pathogenicity.

35, or 74.5 per cent, were of the avian type. It seems significant that in no instance were bovine tubercle bacilli demonstrated.

Human tubercle bacilli were isolated from the lesions of only 3 of the 11 lots of swine. The total number of animals in the 3 lots was 69. Twenty-four of the 69 carcasses had been "retained" on account of tuberculosis at the post-mortem examination and tubercle bacilli were subsequently demonstrated in 18. Twelve of the cultures were identified as human tubercle bacilli and 6 as being of avian type.

It is of interest that tubercle bacilli were demonstrated as present in only 47, or 62.7 per cent, of the 75 lesions that were considered as tuberculous by the meat inspectors. The difference in the laboratory findings compared to those of the gross examination may be due to several factors such as: (1) inadequacy of the methods used to demonstrate tubercle bacilli; (2) the bacteria may have been dead or avirulent or too few in number to initiate growth on culture medium or produce lesions of tuberculosis in guinea pigs; and (3) some of the lesions in which tubercle

bacilli were not established may have been due to causes other than tubercle bacilli. Many of the lesions were minimal in extent and some at least were grossly without convincing characteristics of the lesions of typical tuberculosis.

COMMENT

The susceptibility of the hog to each of the three types of the tubercle bacillus makes the incidence of tuberculosis in swine a fairly satisfactory index as to the amount of bovine, human, and avian tuberculosis in a given community. It is recognized, of course, that the possibility for exposure constitutes an important factor. It is conceivably possible by strict hygienic measures to rear swine free of infection with tubercle bacilli, even though the incidence of tuberculosis in human beings, fowl, and cattle may be high. However, the unsanitary practices frequently followed in rearing and feeding swine for the market usually provide opportunities for contact with one or each of the three types of tubercle bacilli, providing tuberculous fowl, cattle, or human beings exist on the

same premises with the swine, or the animals are supplied foodstuffs containing tubercle bacilli.

Although the susceptibility of swine for avian and bovine tubercle bacilli has been adequately established by many competent investigators, the infectiveness of human tubercle bacilli for swine is not as well understood.* A brief review of the available reports on this question would therefore seem appropriate.

Dinwiddie^{6,7} of the Agricultural Experimental Station of Arkansas in 1899 and 1900 contributed two noteworthy reports on the question of the relative virulence for domestic animals of human and bovine type of bacilli and included a comprehensive review of the literature. He mentioned the experiments of Blumberg who succeeded in infecting swine with sputum from tuberculous human beings. Dinwiddie also made reference to Wesener's review made in 1885 in which it was concluded that of the 71 animals used in feeding experiments, guinea pigs and swine were the species most easily infected with infectious material from tuberculous human beings.

Dinwiddie also reported the results of his own studies in which swine were exposed to experimental infection with human and bovine tubercle bacilli. Tuberculosis of the submaxillary and mesenteric lymph nodes followed the ingestion of tuberculous sputum in 2 of 6 animals tested. A more severe tuberculosis followed the intraperitoneal injection of swine with infective sputum or cultures, and Dinwiddie concluded that a progressive and even fatal tuberculosis may develop in swine following the ingestion of sputum containing tubercle bacilli. Although Dinwiddie expressed the opinion that infection

of swine with human tubercle bacilli is insignificant compared to the greater possibility for infection with bovine tubercle bacilli, he mentioned that the experimental evidence did not preclude the possibility of the occasional occurrence in swine of tuberculosis from human sources.

Orth in 1902 was quoted by Salimon as having tested the virulence of human tubercle bacilli for swine. The strain which was used to inoculate 2 swine intraperitoneally and intratracheally was obtained from a case of "phthisis cavernosus" in a human being. The intraperitoneal inoculation failed to induce demonstrable signs of tuberculosis while the animal that had received the infective material intratracheally showed extensive disease in the right lung and in the thymus gland when examined at necropsy 5½ months after inoculation.

Dean and Todd (1902) conducted a series of experiments designed to ascertain whether the virulence of human tubercle bacilli for calves might be increased by passage through other animals including swine. The infectious material used was tuberculous sputum. This was used to inoculate 5 pigs subcutaneously, and in addition 3 pigs received tuberculous sputum by ingestion. Four of the animals inoculated subcutaneously died in 31 to 137 days, while the 5th was killed after 227 days. Severe and widely distributed lesions of tuberculosis were noted in each of the 5 animals. Those receiving the infective material by the mouth developed tuberculous lesions of the head and neck. The authors concluded that in contradiction to Koch's results, human tubercle bacilli are capable of producing in swine a rapidly fatal generalized tuberculosis.*

* The pathogenicity of avian tubercle bacilli for swine is considered in detail in the monograph by Feldman, W. H. *Avian Tuberculosis*. Williams & Wilkins, 1938, 483 pp.

* Dean and Todd gave a brief résumé of Koch's experiments in which 6 pigs were each fed daily for a period of 104 days, 15 cc. of sputum containing tubercle bacilli. In 5 of the animals the results were listed as negative and in 1 animal the

De Schweinitz, Dorset, and Schroeder^{9, 10} studied the comparative virulence for swine of tubercle bacilli obtained from both human and bovine sources. The test animals were injected subcutaneously, 4 strains of tubercle bacilli of human origin and one of bovine origin being used. Of the 8 animals injected, all but one showed generalized tuberculosis when examined at necropsy a few weeks to a few months later. The one exception was without evidence of disease when examined at necropsy approximately 5 months after being inoculated. The authors concluded in part that "certain tubercle bacilli of human origin possess quite as great pathogenic power for hogs as tubercle bacilli of bovine origin." Whether or not the tubercle bacilli of human origin used in the experiments of de Schweinitz, Dorset, and Schroeder were in reality tubercle bacilli of the human type might well be questioned. Three of the cultures used were obtained from the spleens of guinea pigs inoculated, in 2 instances, with tuberculous mesenteric nodes of children, and in the 3rd instance with a tuberculous nodule of the peritoneum of a child. The infective material used to inject 2 of the swine was listed as "human intestine (tuberculous)." In view of the prevalence of the bovine type of extrapulmonary tuberculous infection in children in the era (1904) when the report of de Schweinitz, Dorset, and Schroeder appeared, the bovine character of at least some of the tubercle bacilli that these authors used is not improbable even though the infective material was considered of human origin.

In a report published in 1909, Mohler and Washburn mentioned Bang's ac-

results were listed as "doubtful." Two pigs injected subcutaneously on one occasion with diluted sputum according to Dean and Todd showed only a localized tuberculosis after 100 days and 135 days respectively. When one considers that each swine in the series that Koch exposed to infection by ingestion received a total of more than 1.5 liters of tuberculous sputum, it is difficult to explain the failure of discernible lesions to develop.

count of the appearance of tuberculosis among hogs on a farm where the disease was not thought to exist previously. The infection was said to have resulted from the practice of tuberculous attendants spitting on the hogs' feed and about the premises. Mohler and Washburn also quoted a report of Kuese concerning the loss from tuberculosis of 11 3 months old pigs in a single litter that had presumably become infected from tuberculous sputum. The sputum accumulated during the night from a young woman fatally ill with tuberculosis and was thrown into the yard each morning. The young pigs had the liberty of the yard and it is presumed they came in contact with the infective material as a consequence.

Eastwood and Griffith (1914) mentioned that 2 pigs were fed tubercle bacilli of the human type that had been obtained from another swine and that in both of the animals tuberculosis of the submaxillary and mesenteric lymph node developed. There was also visible a slight dissemination of the disease to the organs.

In the annual report¹⁶ of the Bureau of Animal Industry, U. S. Department of Agriculture, for 1911 there occurs a brief account of tuberculosis occurring in hogs fed garbage from the kitchen of an asylum for the insane. Lesions from 6 animals were obtained for study and tubercle bacilli of the human type were demonstrated from 2, while in 4 hogs bovine tubercle bacilli were present.

The occurrence of tubercle bacilli of the human type in swine has been reported by several other investigators. Cobbett mentioned that the human type of tubercle bacillus had been found in swine in 4 instances. Butler and Marsch observed tuberculous adenitis in 26, or slightly more than 30 per cent, of 86 hogs in Montana that had been fed unsterilized garbage from a hospital in which a number of patients were

affected with tuberculosis. By adequate laboratory tests tubercle bacilli of the human type were demonstrated in several of the lesions. Stein investigated the types of tubercle bacilli responsible for the lesions in lymph nodes removed from 2 garbage-fed swine slaughtered at Denver, Colo. From 1 case avian tubercle bacilli were identified, and from the other case human tubercle bacilli were obtained.

Holth reported 3 cases of tuberculosis in swine due to human tubercle bacilli in Norway, and Pallaske mentioned that 3 cases of tuberculosis in swine due to tubercle bacilli of human type had been observed at the Kaiserlichen Health Office in Germany. Topacio typed 11 strains of tubercle bacilli isolated from tuberculous swine in the Philippine Islands and all were apparently of human origin. Tobel, Schaaf, and Roza reported the occurrence of tubercle bacilli of the human type in swine in the Dutch East Indies; 4 of 5 strains isolated were of human type. Cornell and Griffith investigated the incidence of the different types of tubercle bacilli occurring in the lesions of swine in London. Submaxillary lymph nodes from a total of 103 pigs were studied and tubercle bacilli were demonstrated from 95. Subsequent studies of the 95 strains indicated that 63 were of bovine tubercle bacilli, 31 were of avian tubercle bacilli, and 1 was of human tubercle bacilli.

Recently (1938) Danbolt and Brandt reported on the types of tubercle bacilli in swine in the region of Rogaland, Norway. The lesions from 160 tuberculous swine were investigated and avian tubercle bacilli were found in 80 per cent of the cases. Tubercle bacilli of the human type occurred in 17.5 per cent and bovine tubercle bacilli in 2.5 per cent.

The data that have accumulated concerning the pathogenicity of the human tubercle bacillus for swine indicate that

this microorganism is capable of infecting swine and that infection in most instances is introduced into the body by way of the alimentary tract. That garbage may at times contain tubercle bacilli seems to have been amply demonstrated. The presence of avian tubercle bacilli can in most instances be easily accounted for. Chickens affected with tuberculosis are not uncommonly dressed for food and the offal which frequently contains lesions of tuberculosis is usually disposed of by discarding it with the garbage. Unless such garbage is cooked, it constitutes a fruitful source of infection for other fowl and for swine.

The source of human tubercle bacilli in garbage probably is, in nearly all instances, infectious material from human beings affected with active tuberculosis. All uncooked garbage from tuberculosis sanatoria or from hospitals or private homes where tuberculous patients are cared for must be considered potential sources of tuberculous infection for swine. That apparently healthy food handlers may be sources of tuberculous infections is suggested by the report of Martin, Pessar, and Goldberg. By roentgenologic, sputum, and physical examinations these investigators found active pulmonary tuberculosis in approximately 2 per cent of presumably healthy food handlers in New York City. No doubt a large number of unknown and uncontrolled cases of active pulmonary tuberculosis exist in many large metropolitan areas. Expectorations and droplet infections from infected food handlers and patrons of public eating houses would of course be sufficient to provide possible sources of tuberculosis in swine-fed uncooked garbage. Other sources of tuberculosis of the human type of swine would be tuberculous employees of hog feeding establishments.

Swine affected with human tubercle bacilli are not necessarily a serious

hazard to human health provided the carcasses of such animals are subjected to a proper post-mortem examination by a qualified meat inspection service. Since the lesions in swine due to infection with the human tubercle bacillus are usually slight and localized and limited to one or several lymph nodes with no evidence of recent invasion of the systemic circulation, such carcasses are usually "passed for food" after the affected tissues have been removed. If the disease be severe and extensive the carcass is sterilized or condemned as unsuited for food.

It should be recognized, however, that lesions of tuberculosis in swine due to tubercle bacilli of the human type constitute a possible occupational hazard to slaughter-house employees and to meat inspectors. The latter especially are likely to come in contact with infectious material. Handling of diseased viscera and lymph nodes with the bare hands is a routine procedure and since the objective of the post-mortem examination is to discover evidence of morbid changes, the examination is carefully and thoroughly done. Manipulation of diseased tissues cannot be avoided, and the possibility for cutaneous infections exists.

Aside from the problem created in swine by infection with human tubercle bacilli the fact that such infections occur should be of interest to those concerned with the public health. If the dissemination of human tubercle bacilli is occurring in a community in sufficient numbers to produce tuberculosis in swine it is reasonable to believe that the source of such pathogenic organisms is a potential danger to other human beings. This thought should inspire an increased effort to search out subclinical cases of tuberculosis in order that the proper supervision may be exercised to prevent transmission of the disease to others who may be susceptible.

In this study the lack of certain pertinent data concerning the origin of the respective lots of swine precludes establishing definite proof that the tuberculous infections demonstrated were derived from the garbage that had been fed. The possibility that at least some of the infections were established before the period when the feeding of garbage was begun must be admitted. However, the likelihood of much of the infection being transmitted through the garbage seems a reasonable presumption.

SUMMARY AND CONCLUSIONS

In order to determine the types of tubercle bacilli in the lesions of tuberculosis in swine-fed uncooked garbage, a study was made of material obtained from a large metropolitan area. The total number of garbage-fed hogs examined at post-mortem examination was 264. Lesions of tuberculosis were established by the meat inspectors in 75, or 28.4 per cent. All lesions studied were those involving lymph nodes. By culture procedures and the inoculation of guinea pigs tubercle bacilli were demonstrated in 47. Subcultures were obtained of each of the 47 strains and the bacillary type of the respective strains was determined by tests for pathogenicity. Guinea pigs and rabbits were used. Thirty-five, or 74.5 per cent, of the strains were tubercle bacilli of the avian type, and 12, or 25.5 per cent, were tubercle bacilli of the human type.

The results suggest the following conclusions:

1. The failure in this study to demonstrate bovine tubercle bacilli appears significant and indicates the success achieved in eliminating tuberculosis from cattle.
2. It is probable that the garbage fed contained a considerable amount of offal from tuberculous fowl, indicating that tuberculous chickens are commonly sold for food.
3. It would appear that infective material from human beings affected with active

tuberculosis is not always properly disposed of, and that such material is a potential hazard to human health.

4. The presence in swine of tubercle bacilli of the human type constitutes an additional reason why unselected garbage should not be fed in an uncooked state to swine.

REFERENCES

1. Butler, W. J., and Marsch, Hadleigh. Tuberculosis of Human Type in Garbage-fed Hogs. *J. Am. Vet. M. A.*, 70:786-790 (Mar.), 1927.
2. Cobbett, Louis. The Rôle of the Three Types of Tubercle Bacilli in Human and Animal Tuberculosis. *Lancet*, 1:979-983 (May 20), 1922.
3. Cornell, R. L., and Griffith, A. S. Types of Tubercle Bacilli in Swine Tuberculosis. *J. Comp. Path. & Therap.*, 43:56-62 (Mar.), 1930.
4. Danbolt, Niels, and Brandt, Anton. Sarkoiidähnliche Hauttuberkulose, durch Hühner-tuberkelbacillen hervorgerufen. *Arch. f. Dermat. u. Syph.*, 178:76-86 (Aug.), 1938.
5. Dean, George, and Todd, Charles. Abstract of Certain Experiments on Tuberculosis. *Lancet*, 2:1186-1187 (Nov. 1), 1902.
6. Dinwiddie, R. R. The Relative Virulence for the Domestic Animals of Human and Bovine Tubercle. *Bull. 57, Arkansas Agri. Exper. Sta., Fayetteville*, June, 1899.
7. Dinwiddie, R. R. The Relative Susceptibility of the Domestic Animals to Contagia of Human and Bovine Tuberculosis. *Bull. 63, Arkansas Agri. Exper. Sta., Fayetteville*, Dec., 1900.
8. Eastwood, Arthur, and Griffith, F. *Rep. Local Gov. Board, London, 1914*, N. S. 91, 132 pp.
9. Experiments Concerning Tuberculosis. Part II. The Comparative Virulence of Human and Bovine Tubercle Bacilli for Some Large Animals. *21st Ann. Rep. of the Bureau of Animal Industry*. U. S. Dept. of Agr., Government Printing Office, Washington, D. C., 1904, pp. 169-186.
10. Germanio, P. J. Hazards Occurring Among Garbage-fed Hogs. *Vet. Med.*, 34:240-242 (Apr.), 1939.
11. Holth, H. Avsluttende underskelser over bacilltypene ved tuberkulose hos svinet. *Norsk. Vet-tidskr.*, 44:129-136; abstracted, *Vet. Bull.*, 3:663 (Dec.), 1933.
12. Mohler, J. R., and Washburn, H. J. Tuberculosis of Hog; Its Cause and Suppression. *24th Ann. Rep. of the Bureau of Animal Industry*. U. S. Dept. of Agr., Government Printing Office, Washington, D. C., 1907, pp. 215-246.
13. Pallaske, Georg. Studien zum Ablauf, zur Pathogenese und pathologischen Anatomie der Tuberkulose des Schweines. (Beitrag zum vergleichenden Studium der Tiertuberculose.) *Ztschr. f. Infektionskr.*, 39:211-260 (June 8), 1931.
14. *Report of the Veterinary Director General, Department of Agriculture, Canada, for the Year Ending March 31, 1938*. Ottawa, 1938.
15. Salmon, D. E. Bovine Tuberculosis and Other Animal Diseases Affecting the Public Health. *19th Ann. Rep. Bureau of Animal Industry*, U. S. Dept. of Agr., Government Printing Office, Washington, D. C., 1902, pp. 332-353.
16. de Schweinitz, E. A., Dorset, M., and Schroeder, E. C. *28th Ann. Rep. of the Bureau of Animal Industry for the year 1911*, U. S. Dept. of Agr., Government Printing Office, Washington, D. C., 1913, p. 59.
17. Stein, C. D. Human and Avian Types of Tubercle Bacilli Recovered from Swine. *J. Am. Vet. M. A.*, 83:105-109 (July), 1933.
18. Tobel, L. W. M., v. o., Schaaf, A., and Roza, M. Type Differentiatie van Tuberkillacillen afkornstig van rund, buffel enverken in Ned. Vost-Indië. *Geneesk. Tijdschr. v. Nederl., Indië*, 77:406-435 (Feb. 16), 1937.
19. Topacio, Teodulo. Tuberculosis of Swine in the Philippine Islands. *Philippine J. Sc.*, 52:349-367 (Dec.), 1933.

Methods of Poultry Evisceration and Packing and Their Relation to Health

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ONE of the most important factors to be considered on the subject of recent methods of poultry evisceration and packing, and their significance to health, is that of post-mortem inspection of poultry at the time of slaughter, or prior to its being processed in a poultry canning plant. The inspection of poultry is not compulsory but is a service conducted under the supervision of the Bureau of Agricultural Economics, U. S. Department of Agriculture, and is available to interested poultry packers upon their voluntary application, and the payment of the cost of rendering the service to them. The importance and advantages of such inspection in the preparation of poultry for market is readily conceivable to the consumer and likewise to the many packers who utilize this service.

Since the time that poultry was produced and marketed as merely a by-product of the farm, there have been many changes. New methods have been employed in the breeding, hatching, raising, feeding, slaughtering, plucking, packaging, processing, storing, and transporting, through the channels of trade to the consumer, of this popular meat food product. These various changes have unquestionably been of great economic importance to the poultry industry and likewise have been an important factor in bringing

to the family table a more palatable, wholesome, and healthful food.

A number of years ago little attention was given to the preparation of poultry for market; it was simply slaughtered at convenient times and marketed regardless of condition and quality. Today, much of the live poultry to be marketed is delivered to a central poultry feeding station where it is carefully graded for condition. Birds showing evidence of disease or sickness are usually destroyed at this time. After this individual handling of the birds, they are placed in wire feeding batteries and kept on a milk feed mash diet for approximately a week. During this time of special care and diet, the fibers of the meat become soft and of finer texture and much improved in flavor, and the birds make considerable gain in weight. As they are constantly watched by the feeders, any birds appearing to be in off-condition are immediately destroyed or isolated from the healthy birds. At the conclusion of the feeding period they are ready for slaughter.

The new methods of slaughter and dressing which are now employed are a great improvement over those which were used when all of the day's kill was immersed in the same tank of scalding water to make feather plucking easy. After slaughter and plucking, the birds are hung on racks in a

cooling room so that the animal heat will leave the carcass as quickly as possible. The following day they are graded into various classes according to weight and quality, packed usually 12 to a box, and stored in a freezing room at temperatures ranging from zero to below. This is the procedure which is generally followed in most of the poultry packing plants of today. As poultry is a seasonal product, it must be packed during the season of plenty and held under refrigeration to be marketed in the season of scarcity or at any time there is a favorable market for it.

Prior to 1928, little if any thought was given to the necessity of inspection of poultry. All poultry, whether fresh dressed, frozen, or prepared into canned products, was marketed and accepted by the consumer without inspection of any kind. About that time the New York City health authorities placed a regulation in their sanitary code prohibiting the sale of eviscerated poultry in that city unless it had been previously inspected and identified as such by an authorized agency which would be acceptable to them. This regulation particularly affected the packers of canned poultry products in that city, and they at once began to investigate the possibilities of federal poultry inspection; but since the Meat Inspection Act did not include poultry, it was not possible for the Bureau of Animal Industry to offer poultry inspection. However, an Act of Congress gave authorization to the Bureau of Agricultural Economics of the U. S. Department of Agriculture to inspect all perishable farm products including inspection and certification of dressed poultry for condition and wholesomeness. This was the beginning of a much needed service which was acceptable to New York City authorities. Interested poultry canners quickly applied for this service which made it

possible for their products to bear the inspection legend of the U. S. Department of Agriculture, which reads as follows: "Inspected and Certified by Bureau of Agricultural Economics, U. S. Department of Agriculture." Since that time, other large cities have passed similar regulations prohibiting the sale of uninspected canned poultry products, the result of which is that practically all prominent packers of canned poultry in this country are preparing their products under federal supervision.

The packing of canned poultry products has developed into an industry of vast proportions and great quantities of poultry are processed yearly to produce a variety of products such as:

- Chicken soup
- Whole and half chicken in gelatine
- Egg noodle and chicken dinner
- Egg noodle and giblets dinner
- Chicken a la king
- Deviled chicken
- Creamed chicken
- Chicken hash
- Boned chicken
- Chicken a la Creole
- Potted chicken
- Chicken stew with vegetables
- Chicken breasts with sauce
- Chicken tamales in sauce
- Chicken liver paté
- Salad chicken
- Chicken pot pie
- Chicken giblets
- Chicken liver spread
- Chicken liver soup for babies
- Sliced turkey with gravy

As I have previously pointed out that practically all prominent packers of canned poultry and poultry products utilize the poultry inspection service of the Bureau of Agricultural Economics, I shall attempt to describe the general procedure which is followed in the preparation of poultry for processing in a government inspected poultry canning plant.

The first requirement of government inspection is that the plant shall be of a construction that will meet satisfactorily all sanitary requirements of the

regulations. This means walls, floors, etc., constructed of impervious materials which can be easily kept clean by washing; properly trapped sewerage drains; ample natural light; sufficient artificial light for early morning or late evening operations; screened windows; proper ventilation; clean dressing rooms, and sanitary lavatories and toilets for all employees.

The equipment used for the inspection and evisceration of poultry consists of two electric motor-driven conveyor tables, one for inspection and the other for evisceration. These tables are similar to those used in the large packing-houses for small animals. They are a series of stainless steel or monel metal pans attached to a chain conveyor revolving over and under the table, and on each revolution on the underside of the table pass through a washing and sterilizing chamber.

After all pin feathers have been removed from the skin and the hair singed from the carcass, the birds are individually placed in the pans of the inspection table, and as they are carried along the line, plant employees open the abdominal and thoracic cavities to permit the federal licensed veterinary inspector to make inspection of all internal organs. Birds showing lesions of disease or otherwise unfit for consumption are condemned at this time. Fit and healthy birds are now ready for complete evisceration.

On leaving the inspection table, the head and feet are removed and the body of the carcass passed to the eviscerating table (which is similar to the inspection table except that it has stationary dressing units on each side, equipped with sprays of continuous running water). Here all entrails are removed, after which each carcass is conveyed to the end of the table to be immediately and thoroughly washed. These birds are now ready for further processing.

The duties of a veterinary dressed poultry inspector are not only to make post-mortem inspection of each and every bird, but also to see that the entire plant is kept in a sanitary condition at all times, that all processing is carried on under sanitary methods, that all ingredients other than poultry which have been included in approved formulae are of fit quality and of proper proportions, and that the finished product is labelled with only such labels as have been officially approved.

While large quantities of poultry are prepared and processed in canning establishments (and I want to commend the management of this great industry for the methods employed and the quality of poultry used in the producing of a convenient, nourishing, healthful, and palatable product), yet far greater quantities of poultry are prepared and consumed in hotels, restaurants, all kinds of eating places, and particularly in our homes. There are few of us who do not enjoy the meal at which poultry is served, whether it be broiled, fried, fricassee, or roast chicken, or a well browned stuffed turkey, goose, or duck.

Recognizing the fact that almost every home is a potential customer for their product, the dressed poultry packers are now preparing poultry for home consumption in a ready-to-cook fashion and there appears to be a steady and continued demand on the part of the consumer to purchase poultry which has been government inspected, fully eviscerated, washed, dried, and cellophane-wrapped and packaged under strict sanitary regulations. There is little doubt that in the not far distant future a great portion of the poultry produced in this country will be packed and marketed as a ready-to-cook product, and why not?

As I have stated previously, poultry is a seasonal product and, therefore, must be stored under refrigeration from

the season of plenty to the season of scarcity. There is, however, no good reason for holding in a refrigerating plant poultry that has not been previously eviscerated, the same as all other meat food products. The cost of storage and transportation is computed on a weight basis and, therefore, this service would be more economical and would lessen very much the possibilities of contamination and flavor of the product.

The consumer must necessarily become acquainted with the advantages of purchasing fully eviscerated and government inspected, ready-to-cook poultry. There can be no question as to its relation to health. In preparing this specially packaged poultry, only birds of top quality are used. They must be entirely free of pin feathers, they must be soft meated, and well fleshed, and some packers use only birds that will meet the specifications of U. S. Grade A.

The inspection of this poultry is conducted in the same manner as that of poultry for canning purposes. After inspection and complete evisceration and thorough washing by hand, each bird is then dried with paper towels and wrapped in cellophane. The actual net weight of the carcass is plainly marked on the package. All of these operations are conducted under rigid sanitary conditions, and the cellophane wrapping and sealing of the package protect the product from further contamination by handling.

It is necessary that this type of poultry be quickly and thoroughly frozen and kept in that condition until it reaches the consumer. Various types of quick-freezing methods are used and temperatures usually range anywhere from 10° to 50° below zero. In the past there has been some consumer prejudice to frozen foods and especially to poultry, but when one considers that all poultry which is packed in abundance

has been frozen prior to being marketed, it is our opinion that the evisceration and inspection of poultry at the time of slaughter would be a distinct advantage to the industry as well as to the well-being and convenience of the consumer because it is packaged in various types of cellophane sanitary wrapping, and some classes of poultry such as broiling and frying chicken and fricassee fowl are dismembered in proper portions for serving at the table.

If the marketing of this type of poultry is to become successful, the purchaser must expect and accept its delivery to him in a hard frozen condition. The defrosting process is easily and quickly accomplished in the home.

Now in comparison, if the consumer is to continue to accept for home consumption defrosted uninspected poultry, the usual procedure of marketing this type of poultry is as follows. The retail merchant receives the greater portion of his poultry in a frozen condition and it is a common practice of the retailer to defrost the poultry entirely, as it then presents a more normal appearance and is more easily drawn. It is possible that in many instances birds are kept in a defrosted condition for several days before they reach the actual consumer. While being held in this condition, chemical action and decomposition take place, and the gases which form from the intestinal contents and food in the crop and gizzard permeate the flesh. This results in a strong flavor in the poultry, and there is also the possibility of the presence of disease as well.

Poultry consumed in the home is as a rule eviscerated by the butcher, who is not educated to detect the lesions of disease, and therefore could not very well pass on its fitness for food, as far as disease is concerned. In many instances, the work of evisceration of poultry in the retail market is done on the same cutting-board or chopping-

block where other meats are cut. There are usually considerable intestinal excreta and other fluids from the carcass smeared over the cutting-board, and if this filth is not immediately and thoroughly cleaned off, the next steak which is sliced off a loin of beef is likely to become contaminated to some extent. This practice indicates the desirability of poultry being delivered to the market fully eviscerated, after have been inspected, the same as other meat products. There are, of course, sanitary meat markets where a special work-bench is provided for the handling of poultry.

As a matter of information concerning the quantity of poultry now being government inspected in the United States, there have been inspected during the period of a year 43,550,124 lbs., of which more than 743,777 lbs. were

condemned as unfit for food. The causes for condemnation were various, such as avian tuberculosis, septicemia, emaciation, decomposition, peritonitis, tumors, leukemia, abscesses, and other conditions, but avian tuberculosis by far exceeds all other causes for rejection of poultry as unfit for food. Poultry which has been condemned by the inspector as not fit for food purposes is denatured usually with crude carbolic acid or denaturing oil, or in many instances incinerated.

In conclusion, it would seem of great importance that the housewife particularly, who is greatly interested in promoting the health and well-being of her family, should insist, when making purchases of either canned poultry products or full eviscerated poultry, that it show identification of having been government inspected.

Typhoid Fever and Vegetable Juices (Carrot)

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THE importance of adequate supervision and control of food manufacturing and dispensing establishments was demonstrated in a recent investigation by the San Francisco Department of Public Health.

A case of typhoid fever was reported. The important facts are: V. T., age 40, a secretary, became ill. Clinical symptoms suggested typhoid fever, which diagnosis was confirmed in the laboratory. There was no evidence pointing to a source of infection outside of the city of San Francisco. The patient ate at home or at the homes of friends or relatives except for lunches, which were eaten at 4 food shops, but most frequently at one, a food store specializing in the sale of vegetable juices.

A second case of typhoid fever was T. N., age 22, a clerk in a large department store. The onset of symptoms was approximately on the same date as in V. T. Blood and stool cultures were positive for *E. typhosus*. This patient had limited his activities to the city of San Francisco, except for Sunday automobile trips to the country, on which food and water were carried from home. All meals were consumed at home, except lunch, which was taken at the same food store most often patronized by V. T.

DISCUSSION

The usual routine investigation of food handlers and the examination of food products that might have been a source of infection were carried out. Investigation including stool examinations of all known family contacts as well as the food handlers in the restaurants and the food store involved, was made.

The vegetable juices sold by the food store showed a high bacterial count. It was found that pasteurization of these juices had been incompletely carried out, or omitted, in violation of the regulations of the Department of Public Health, effective November 3, 1936.

The worker recently assigned to the direct preparation and handling of the vegetable juices was found to be a typhoid carrier. Stool specimens were positive for *E. typhosa* on 3 successive examinations. All other laboratory examinations were negative.

The typhoid carrier, C. K., age 40, had worked as a domestic in several families and gave a history of having had typhoid fever 34 years previously. She admitted that the vegetable juices had generally not been pasteurized.

LABORATORY STUDIES

A short series of studies in the labo-

ratory made clear the more essential points. A prolonged study is necessary, however, to provide a complete background for control work.

Freshly prepared carrot juice is a slightly acid product, pH 6.5 to 6.7. The bacterial content of fresh juice varies between wide limits, coming from the surface of the carrot and from the steps in processing. A perfect cleansing operation, in the surgical sense, followed by aseptic technic, should result in virtual sterility. Using elaborate precautions, however, a minimum count of 2,800 colonies per cc. was secured. The maximum count was 3,000,000 colonies per cc.

No standards exist with regard to bacterial colony counts as an index of sanitation, and it is questionable whether any satisfactory standard of this sort should or could be practically established. The results when elaborately careful laboratory preparations of juice were tested suggest strongly that the fluctuations in counts in juice from any given establishment would be so wide that differentiation between sanitary and unsanitary preparation on the basis of a colony count would not be proper. Emphasis must be placed on sanitary premises, on thorough cleansing operations at all points, and on personnel.

Pasteurization follows principles which have been firmly established. In no sense does pasteurization sterilize the juice which may, therefore, be expected to spoil. Both raw and pasteurized juices are excellent culture media for bacteria. The heating process, however, by reducing the number of living organisms and injuring others, induces a definite lag in spoilage. This lag may be real and may be helpful, but it should not be emphasized; juice still may spoil so rapidly that it is necessary to guard against a false sense of security. Spoilage is ordinarily indicated by decomposition, leaving a

product wholly unpalatable. This is accompanied by some acidification (pH 4.5 or higher, depending on the juice and the conditions of holding). The acidity of fresh juice is not significantly altered by pasteurization. Pasteurization reduced the colony count materially in all cases but, due to the different flora and to minor variations in the heating process, much irregularity was observed. Reductions in count to 1/50 or 1/100 of the count on raw juice were usual.

The chief value of pasteurization is that it destroys pathogenic organisms and that it does this during the last stage of preparation. Experiments showed that coliform organisms were usually eliminated and always sharply reduced. Freshly isolated *E. typhosa*, liberally inoculated, in no case survived. The typhoid bacillus did not die in raw juice; *i.e.*, the juice itself does not kill this organism. Extended investigation would be needed to demonstrate conclusively that 140° F. for 30 minutes is not adequate and that 142° F. or 143° F. for 30 minutes would be preferable as a lower limit. This conclusion was suggested from the data secured, however, particularly if rapid cooling following pasteurization is practised.

Chlorination as such was not found to be satisfactory. Even with carefully scrubbed hands, with carrots immersed in chlorine, 200 p.p.m., and with the use of completely sterilized apparatus, the bacterial count was appreciable and spoilage was not greatly delayed. Chlorination is, of necessity, introduced at an early stage in a processing in which the later stages introduce the greater risk. The practical proof of the value of chlorine rinse of the washed carrot followed by extraction and pasteurization of the juice would be difficult due to the lack of suitable criteria for the measurement of the potential degree of effectiveness. The

action of chlorine, however, might be worth considering if standards are to be established, not as adequate by itself but as an additional step in the preparation of good juice for pasteurization. The bacteria are ground in and a casual washing process will not be offset by chlorine treatment. Examination of a carefully scraped carrot, rinsed in clean water, would inevitably show that more bacteria had been *removed*. Further investigation might show that, between improved cleansing and chlorine, the former would be preferable; but that, between the best practical cleansing operation without chlorine and with chlorine, the use of chemical aid might be worth while. No laboratory evi-

dence has thus far been adduced to favor the use of chlorine at any stage.

COMMENT

The pertinent facts given above illustrate the necessity for very close, frequent, and careful supervision by health authorities over food establishments preparing and serving foods of any character, but particularly, as in this instance, unheated, or partially heated, extracts and juices from vegetables.

Specific orders of the Department of Public Health as to the pasteurization of such juices were apparently ignored or forgotten, with two cases of typhoid fever as a result.

Medical and Nursing Service

I WISH to voice a resentment to the implication that men and women in public service are any less worthy in education, in capacity, in attention, in interest, in devotion to duty, than those who are in what we call "private life." I resent the imputation that a salary stultifies, that we must receive a fee for every service rendered or else perform it grudgingly or inefficiently or both. This is no more true of the medical and the nursing professions than

it is of those who are by established custom paid for their services in this way. Granted a satisfactory standard of living, the remaining satisfactions are not those derived from monetary income, but from an appreciation of work well done.—Edward S. Godfrey, Jr., M.D., State Commissioner of Health, in address before the 1939 Annual Conference of Health Officers and Public Health Nurses, Saratoga, N. Y.

Outbreak of Staphylococcus Milk Poisoning in Pasteurized Milk

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A NUMBER of epidemics of staphylococcus toxemia from milk and related foods have been reported.¹⁻⁴ Some strains of *Staphylococcus aureus* secrete soluble exotoxins which give rise to acute attacks of diarrhea. A number of epidemics from this cause have been reported. The organism grows best in foods containing considerable carbohydrate. Cake, custard, eclairs, and milk contaminated by an abscess in a cow's udder have been incriminated.^{5, 6} This report is made not because the condition is new or rare, but because the method of contamination is of particular interest, and because the milk, being pasteurized, was supposedly safe.

On Saturday morning of September 25, 1937, the Oklahoma Agricultural and Mechanical College Infirmary admitted 9 students between 10 o'clock and noon, having the usual symptoms of an acute gastro-intestinal intoxication, with varying degrees of severity — nausea, vomiting (some bloody), cramping, and diarrhea. These 9 persons ate their breakfast at three different places. A hasty check with private physicians of Stillwater revealed 3 cases at one other address—a total of 12 cases within 2 hours' time.

Again shortly after the noon meal, between 1 and 3 o'clock, 5 more cases were admitted to the college infirmary, all from one fraternity house, and 3

cases were reported by a private physician—a total of 8 cases from three houses within 3 hours after lunch.

No more cases were reported until Monday, September 27, (2 days later) when 4 more cases were admitted to the college infirmary and 5 more cases were reported by private physicians. This made a total of 9 cases for the day, from 4 different houses. These cases resembled very closely those of 2 days earlier.

Epidemiological investigation of all cases revealed one fact—all 29 had drunk varying amounts of milk produced by one local pasteurizing plant. Some had drunk milk, some used it on cereals, and one mild case used it only in hot chocolate. Other members of these families and boarding houses who ate at the same table but who did not use milk suffered no ill-effects whatever. In one case the husband used no milk for breakfast but drank milk for lunch from the same bottle from which his wife drank in the morning. He likewise became quite ill within 2 or 3 hours after lunch, as had his wife after breakfast.

The onset in most of the cases was approximately 3 hours after drinking the milk, but varied from 1½ to 7 hours. Other foods tested from places where several persons were ill revealed no toxic bacteria.

Remaining portions of milk were collected from the various places where

cases occurred and samples from the same bottles as those causing illness were tested and found to contain "potentially toxic staphylococci; no hemolysis; active zoning."

All milk causing illness is thought to have been pasteurized on Friday, September 24, 1937. Of the 9 cases occurring on the 27th, 5 are known to have drunk milk purchased from a fruit stand on Sunday afternoon, September 26, and left there the day before. The remaining 4 cases had delayed opening their milk over the week-end for various reasons.

Records of all pasteurizations from September 23 to 29 were examined. These showed that the pasteurization had been carried out properly. The phosphatase test revealed adequate pasteurization of all samples tested, including some of those which actually caused illness and from which staphylococci were cultured. These facts led us to believe that contamination occurred after pasteurization, for that process would have killed the organisms even though it might not have destroyed the soluble toxins.

Inspection of the pasteurizing plant revealed that equipment was in good condition but that it was not at all adequate in so far as safe and clean milk production is concerned. Cleaning and sterilizing equipment were found inadequate and bottling and capping were being done by hand.

Five employees of the plant were examined and 3 of these were found to have positive nose or throat cultures for "potentially toxic staphylococci." One of these persons had pustules on his face and body.

Cultures on raw milk samples from 6 producers for the plant revealed "potentially toxic staphylococci" in 4 of the 6 supplies; therefore work needs to be done on herds of producers as well as in the plant.^{1, 7}

The actual method of contamination

of the pasteurized milk must of course be more or less a matter of supposition, but it seems quite likely that it occurred in bottling and capping, either by contamination from hands, or by sneezing or coughing across a group of bottles.

SUMMARY AND CONCLUSIONS

1. The week-end outbreak consisted of a total of 29 cases from 11 different residences. All but 3 or 4 of the cases were able to leave the infirmary or care of their physicians the following day. These 3 or 4 remained in the hospital from 2 to 4 days, the reason being the extreme weakness following severe nausea, cramping, bloody vomiting, and bloody diarrhea.

2. "Potentially toxic staphylococci" were isolated from samples of milk causing illness and upon which the phosphatase test revealed adequate pasteurization; therefore contamination occurred after pasteurization.

3. "Potentially toxic staphylococci" were isolated from the nose or throat of 3 of the 5 employees of the plant, one of whom had numerous pustules on his face and body.

4. Contamination presumably occurred during the process of bottling and capping, which were done by hand.

5. Equipment at the plant, though in good condition was quite inadequate.

6. The plant in question sold its milk as "Grade A Milk," yet was not violating any of the provisions of the city ordinance in effect at that time. The U. S. Public Health Service Standard Milk Ordinance adopted a short time previously and to be put into effect the following January 1, 1938, contains provisions which make the combination of circumstances responsible for this outbreak quite improbable.

NOTE: I wish to express my appreciation to all those who rendered valuable assistance in stopping this outbreak, reporting cases, and locating the source. In particular I should like to mention among these Dr. W. C. Thompson, Director of the Student Health Service of the Oklahoma A. & M. College; Dr. M. R. Beyer, Epidemiologist, and W. J. Wyatt, Milk Specialist, of the Oklahoma Health Department; C. R. Millard, Sanitarian of the Payne County Health Unit; C. P. Peck, City Milk Inspector of Stillwater, Oklahoma, and the Laboratory of the Oklahoma Health Department.

REFERENCES

1. Crabtree, J. A., and Litterer, W. Outbreak of Milk Poisoning Due to a Toxin-producing Staphylo-

coccus Found in the Udders of Two Cows. *A.J.P.H.*, 24, 11:1116 (Nov.), 1934.

2. Roberts, James, Deadman, W. J., and Elliot, G. J. An Outbreak of Staphylococcal Food Poisoning. *Canad. Pub. Health J.*, July, 1938, p. 325.

3. Cogswell, William F., Kilbourne, Burton K., and Kuhns, Edith. Staphylococcal Food Poisoning in Billings, Montana: *Canad. Pub. Health J.*, July, 1938, p. 33.

4. Shaughnessy, H. J., and Grubb, T. C. Staphylococcus Food Poisoning, Report of a Small

Milk-borne Epidemic. *J. Infect. Dis.*, 58:318, 1936.

5. Shaughnessy, H. J., and Grubb, T. C. The Incrimination of Milk and Milk Products in Staphylococcus Poisoning. *Canad. Public Health J.*, May, 1937, p. 229.

6. Dack, G. M. Staphylococci in Relation to Food Poisoning. *A.J.P.H.*, 27, 5:440 (May), 1937.

7. Brooks, Paul B., and Tiedeman, Walter Von D. Relation of Bovine Mastitis to Human Disease. *A.J.P.H.*, 27, 4:334 (Apr.), 1937.

Health Department Personnel

THE funds for the courses given to our new personnel have all come from the federal government and it is proper that this should be the source. We have no assurance that the person so trained and educated will remain in the employment of New York State or one of its component municipalities. I am opposed to stipulating any such obligation on the part of the recipients or of the state. Not only is there some doubt in my mind as to the legality of such a stipulation, but it seems a most unwise requirement. To hold a person to a job against his will, against his best interests, can only lead to discontent and a disturbance of morale which may be more costly than the expense of education and training. He should be

free and not a bondsman. On the other hand, this state and its municipalities should be free to seek personnel wherever the best qualified can be found, whether in this state or another, whether trained under our allotment or that made to another state. Parochialism has no more place in the government service, especially the public health service, than it has in commerce and industry. If the public really wants a comparable efficiency, it must grant government a comparable freedom in the selection of those who are to serve it.—Edward S. Godfrey, Jr., M.D., State Commissioner of Health, in address before the 1939 Annual Conference of Health Officers and Public Health Nurses, Saratoga, N. Y.

A Comparison of MacConkey's Broth and Standard Lactose Broth as Media for Detection of Coliform Organisms in Water

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SINCE the first year of the 20th century the name of Alfred MacConkey has been closely linked with the development, in England and many other parts of the British Empire, of bacteriological methods of water analysis. It was in 1901 that MacConkey and Hill, following earlier research by the former on the use of bile salts for the differentiation of certain groups of bacteria, published a paper entitled, "Bile Salt Broth. A Simple Test for Faecal Contamination."¹ Their suggestion of the use of bile salts in sugar broth for facilitating the search for coliform organisms in water met with immediate favor, and was soon adopted by the great majority of British bacteriologists. To this day bile salts have remained in British practice an indispensable ingredient of the primary medium employed for detection of the presence of coliform organisms in water, sewage, milk, and a variety of other materials.

The original formula of MacConkey broth, however, is not exactly that which is in use today. The earlier bacteriologists, recognizing the fact that many enteric disease organisms

ferment glucose but not lactose, quite naturally concluded that the fermentation of glucose offered the best primary indication of the presence in a water of organisms associated with dangerous pollution. The same predilection for glucose in enrichment media is evident in the formulae for glucose broth employed at that time by American bacteriologists, but before long it was realized that the glucose fermenting group includes a vast number of organisms which do not compare with the lactose fermenters as pollution indicators, and gradually the glucose of MacConkey broth was displaced by lactose. Similarly, on this side of the Atlantic, the glucose broth employed as primary medium was superseded by lactose bile.

This substitution of lactose for glucose constitutes the only important modification that the original MacConkey broth formula has suffered. It is interesting to compare, for example, this original formula with that used today by the Metropolitan Water Board of London.

One other, but minor modification has been rather generally accepted. Following the suggestion of Savage,²

Original MacConkey

Sodium taurocholate	5 gm.
Glucose	5 "
Peptone	10 "
Water	1,000 cc.
Litmus	to give distinct color

Metropolitan Water Board

Sodium taurocholate	5 gm.
Lactose	10 "
Peptone	20 "
Water	900 cc.
Litmus	100 cc. 0.5% solution

neutral red is often substituted for the litmus of the formula, not only because neutral red is a more satisfactory indicator of acid fermentation but also because many coliform organisms produce, in a glucose or lactose medium containing it, a fluorescence that furnishes additional evidence of their presence. The formula recommended in the revised edition (1939) of *Report No. 71*, published by the Ministry of Health,³ which constitutes, for all practical purposes, the British equivalent of the bacteriological section of *Standard Methods of Water Analysis*,⁴ includes this usual modification.

MacConkey broth is employed in fermentation-tubes as a primary enrichment broth, just as is standard lactose broth in the United States and Canada. It must be noted, however, that, unlike standard lactose broth, the ingredients of which are so chosen as to favor the multiplication of the greatest possible number of varieties of coliform organisms, MacConkey's broth, because of its bile salt content, is rather a *selective* medium: the purpose of the bile salt is to inhibit non-coliform organisms, and to favor the multiplication of the so-called fecal type of coliforms (indol positive, methyl red positive, Voges-Proskauer negative, citrate negative). Because of this selectivity, it appears that the multiplication of some coliform types may likewise be inhibited, particularly that of certain

slow lactose fermenting aerogenes organisms.

Nevertheless, partly because coliform organisms of the "fecal" type constitute a large proportion of the coliform flora of Britain's waters compared with that encountered in the waters of some other countries, and partly because English bacteriologists have consequently stressed the importance of a search for the more typical *Escherichia coli* of the coliform group, MacConkey broth has easily held its place in British laboratory practice. Apparently, in Britain, gas in MacConkey broth nearly always indicates the presence of coliforms; *Report No. 71* of the Ministry of Health³ contains, for example, this statement:

It is true that the bile salt has a slight inhibitory effect on the growth of the coliform organisms themselves, but this disadvantage is more than outweighed by the practically complete elimination of false positive reactions. With very few exceptions it may be taken that the production of acid and gas in MacConkey medium inoculated with water indicates the presence of coliform bacilli. Since the conclusive proof of this can be brought only by further tests, a reaction of this sort is generally referred to as a "presumptive positive coliform reaction." The presumption is, *in this country*, however, very high. In other countries, where the water flora is different, false positive reactions in this medium may not infrequently be encountered.

MacConkey broth has never been very generally employed in America. Although the principle of the use of bile ingredients in media has often been proposed here, whole bile (oxgall) instead of bile salt has usually been specified. The chief reason for this preference for whole bile has been an uncertainty regarding the composition of the commercially available "bile salt." There exist, apparently, no generally accepted specifications for the manufacture of this ingredient. English directions for the preparation of MacConkey broth usually designate a par-

ticular supply house or supply houses as the source of the bile salt to be used. Since no control is exercised to insure uniformity of composition of the bile salt sold by different firms, variation in the characteristics of media prepared with different brands of bile salt is to be expected. Even some 15 years ago Sir Alexander Houston, in his *Nineteenth Annual Report to the Metropolitan Water Board* (1925), voiced this complaint:

In pre-war days there were two simple tests of real value: (a) the number of bacteria growing at 37° C. in an agar lactose bile-salt medium, and (b) the gaseous fermentation at 37° C. of liquid lactose bile-salt cultures. The chief reason why these two tests were of such value was the selective character (in favour of *B. coli*) of the bile-salt (introduced by MacConkey). Since the war all the samples of bile-salt that have been tried in the Metropolitan Water Board Laboratories have proved most disappointing in this selective sense, and this, the writer thinks, is common experience. In the old days the presumptive evidence afforded by, at all events, test (b) was so valuable that confirmatory tests seemed almost unnecessary. Now test (a) is almost valueless and implicit reliance cannot be placed on test (b).

Similar complaints have been expressed by other English laboratory workers; and the author has noted marked variations in the characteristics of media prepared with the "bile-salts" furnished by different American firms.

At present, the bile salt usually employed in Britain is designated as "Commercial Sodium Taurocholate" which is supplied by commercial chemists under the name of "sodium tauroglyco-cholate."⁵ The Metropolitan Water Board Laboratories, however, purchase Merck's brand, sufficient material of any one particular batch being prepared by the manufacturer to suffice for a year in order to obtain standard results over that period.⁶

It is obvious that the lack of more or less rigid specifications for the production of the bile salt to be used in

MacConkey's medium constitutes an unsatisfactory situation. British laboratory workers are fully aware of this fact, however, and it is probable that before long they will adopt specifications to insure uniformity of composition of this important ingredient.

EXPERIMENTAL

Occasional inquiries, by American water bacteriologists, regarding the comparative utility of MacConkey broth and standard lactose broth for examination of waters on this continent have led the Committee on Standard Methods to undertake a study of these media. The following four laboratories, two engaged in the control of city purification plants and two state or provincial laboratories, exercising control of waters from a variety of sources, agreed to collaborate in the work.

City of New York—Mt. Prospect Laboratories
F. E. Hale and H. F. Muer

City of Toronto—Centre Island Laboratories
N. J. Howard and R. E. Thompson

State of Maryland—Dept. of Health Laboratories

C. A. Perry and A. A. Hajna

Province of Quebec—Ministry of Health Laboratories

M. H. McCrady and J. Archambault

The New York City samples consisted of raw and treated surface waters; those of Toronto were largely raw, slow sand filtered and drifting sand filtered waters together with a few chlorinated (finished) waters; the Maryland samples included various raw, coagulated, filtered and finished surface waters; whereas the Quebec samples were from springs, wells, lakes, streams and filtration plants, with well (surface and deep) and spring samples predominating.

The routine procedure adopted for this study was as follows:

1. Plant 5 portions of 10 cc. each and 5 portions of 1 cc. each of the sample in standard lactose broth and similar amounts in MacConkey broth.

2. Incubate at 37° C. for 48 hrs.

3. As soon as gas appears in any tube, confirm completely according to *Standard Methods of Water Analysis* (EMB plate, secondary lactose, agar slant, Gram-stained preparations, etc.)

4. As soon as gas appears in a lactose broth tube, in addition to the complete confirmation specified in (3), transfer 1 loopful of the culture to brilliant green bile; incubate the latter at 37° C. for 48 hrs.; and as soon as gas appears in the tube, confirm completely as in (3) above.

These procedures permit comparison of 5 methods of examination:

a. Standard Method with complete confirmation via lactose broth

b. Standard Method with complete confirmation via brilliant green bile

c. Standard Method with confirmation (production of gas only) by brilliant green bile

d. MacConkey broth presumptive test (production of gas only)

e. MacConkey broth method with complete confirmation

The brilliant green bile procedure was included because of the widespread interest in the favorable results secured by this means of confirmation in the course of a previous coöperative study.⁷

The brilliant green bile (2 per cent) and eosin-methylene-blue (both in dehydrated form), the lactose, peptone, and neutral red employed were furnished through the courtesy of Difco Laboratories, Detroit, Mich. "Sodium Taurocholate" was purchased from Baird and Tatlock, London, England (one of the firms suggested as furnishers of this ingredient by Dr. W. M. Scott, of the Ministry of Health, who also informed the author that "Bacto" products such as peptone, agar, lactose, and neutral red would be regarded there as suitable for the preparation of the media listed in *Report No. 71*).

The MacConkey broth used was made according to the formula and directions of *Report No. 71*, given below; double strength broth, in 10 cc. quantities, was employed for the inoculation of 10 cc. portions of sample,

single strength broth for smaller portions.

Commercial sodium taurocholate	5 gm.
Lactose	10 "
Peptone	20 "
Sodium chloride	5 "
Distilled water	1,000 ml.

Directions for preparation: "Steam for 2 hours and transfer to the ice-chest overnight. Filter in the morning through Chardin paper while still cold. Adjust the reaction to pH 7.4, using phenol red as the indicator. Add about 10 ml. of 1 per cent aqueous solution of neutral red and sterilize in the autoclave at 10 lb. for 15 minutes, or in the steamer for 30 minutes on 3 successive days. The finished medium should be clear and should have a claret red color, free from yellow or magenta."

The use of eosin-methylene-blue agar, instead of MacConkey agar, for plating-out from fermentation tubes, constituted a departure from British practice, but since there seemed to be no reason for believing that E.M.B. agar was inferior to the other, and since most workers here are much more familiar with the former than with the latter medium, the departure appeared to be justified.

It may be noted, in this connection, that Atkinson and Wood,⁸ working with Australian waters, succeeded in completely confirming 296 of 614 presumptives with the aid of E.M.B. agar, and only 277 by using MacConkey agar, despite an unusual practice of fishing mixed growths on MacConkey agar to fermentation tubes and again plating on MacConkey agar. It must be admitted, however, that absolutely identical results may not be secured from the use of MacConkey agar and that of E.M.B. agar.

RESULTS

The results obtained by means of the 5 different methods employed are shown in Table I.

It will be observed that, in the aggregate, the number of coliform isolations was about the same whether Mac-

TABLE I

*Results of 5 Different Methods of Examination of Water Samples**

		MacConkey Broth Primary Tubes			Lactose Broth Primary Tubes			
		Presump- tives Gas +	Coliform Isolations		Presump- tives Gas +	Br. Green Confirmation		
No. of Samples Producing Gas in One or Both Primary Media			No.	Per cent		Coliform Isolations	Gas	Coliform Isolations
New York City	96	217	131	60	367	132 (12)	141	115 (6)
Toronto	30	134	82	61	137	92 (8)	127	98 (2)
Maryland	22	94	92	98	124	92 (1)	87	86 (1)
Quebec	73	406	326	80	442	327 (34)	359	335 (8)
		851	631	74	1,070	643 (55)	714	634 (17)

* Figures in parentheses indicate the number of tubes showing gas from which no coliforms were isolated, but from the corresponding lactose broth primary of which, coliforms were isolated by the other method. Thus, the indication (6), at the end of the first line of the table, signifies that 6 of the 141 gas positive brilliant green confirmatory tubes failed to yield coliform upon attempted isolation, but coliforms were isolated directly from the corresponding 6 lactose broth primary tubes.

Conkey broth, lactose broth, or lactose broth followed by secondary brilliant green bile was employed. Toronto's coliform isolations by means of these 3 media, however, numbered 82, 92, and 98 respectively, the use of MacConkey broth resulting in a loss of 16 per cent of the number of coliform isolations secured through the use of lactose broth followed by transfer of gas positives to brilliant green bile. Quebec's results are somewhat similar, although here the loss due to the use of MacConkey broth was only about 3 per cent. New York and Maryland, on the other hand, isolated the same number of coliforms from MacConkey broth and lactose broth, the use of brilliant green bile secondary resulting in a loss of 11 per cent and 7 per cent, respectively, of the isolations obtained directly from the other two media.

A comparison of the number of MacConkey presumptives with the number of coliforms isolated from them shows very clearly that in at least 3 of the 4 laboratories gas in MacConkey broth cannot be relied upon as an indication of the presence of coliform organisms detectable by the routine complete confirmation procedure; for from a total of 851 MacConkey presumptives only 631, or 74 per cent, were shown to

contain coliforms. Apparently the coliform flora of the waters examined by 3 of the laboratories differs considerably from that of British waters.

On the other hand, although, as already indicated, about as many coliform isolations were secured from the MacConkey presumptives as from the lactose broth presumptives, the former numbered only 851 whereas there were 1,070 of the latter. In other words, 219, or nearly 20 per cent, fewer presumptives had to be confirmed when MacConkey broth was employed.

It is interesting to compare this experience with that encountered in an earlier study⁷ of the relative utility of fuchsin broth and lactose broth primary media. The data requisite for such a comparison are shown in Table II. The results obtained from the use of confirmatory brilliant green bile are included.

Section A of Table II shows the results of examination of 890 water samples (1936-1937 series) by means of 3 procedures: fuchsin broth primary with complete confirmation; lactose broth primary with complete confirmation; and lactose broth primary followed by brilliant green bile secondary, with complete confirmation of the latter. In Section B are

TABLE II

A. Results from Examination of 890 Water Samples (1936-1937 Series)

		Presumptives		Coliform Isolations		
		No.	Per cent of LBP Presumptives	No.	Per cent of Positive Presumptives	Per cent of LBP + SMC Isolations
Fuchsin Broth	(+ SMC)	2,903	69.1	2,048	70.5	97.06
LBP	(+ SMC)	4,204	100.0	2,110	50.2	100.00
LBP + BG	(+ SMC)	2,384	56.7	2,079	87.2	98.53

B. Results from Examination of 221 Water Samples (1938-1939 Series)

MacConkey Broth	(+ SMC)	851	79.5	631	74.1	98.13
LBP	(+ SMC)	1,070	100.0	643	60.1	100.00
LBP + BG	(+ SMC)	714	66.7	634	88.8	98.60

SMC = Standard Methods Complete Confirmation Procedure (Agar plate, 2nd Lactose, Agar slant, Gram stain, etc.)

LBP = Lactose Broth Primary

BG = Brilliant Green Bile employed for confirmation of Lactose Broth Primary

given the results of examination of the present series of samples by using the same 3 procedures except that MacConkey broth has been substituted for fuchsin broth.

It will be observed that, when fuchsin broth was employed, the number of presumptives to be confirmed was only 69.1 per cent of the number of lactose broth presumptives, although the number of coliform isolations obtained from these fuchsin broth presumptives was 97.06 per cent of the number obtained from the lactose broth presumptives. The corresponding proportions, when MacConkey broth was employed in the later series of samples, were 79.5 and 98.13 per cent. Evidently greater economy of effort, with respect to the proportional number of presumptives to be confirmed, resulted from the use of fuchsin broth in the first series of examinations, than with MacConkey broth in the second series, despite the fact that coliform organisms were isolated with greater facility, at least from lactose broth presumptives, in the latter series (probably because of the larger proportion of typical coliforms, derived from raw and unfinished waters, contained in the second group of samples).

It will also be noticed that the percentages of fuchsin broth and MacConkey broth presumptives that yielded coliform isolations did not differ greatly (70.5 and 74.1), and that the ratios of recoveries from brilliant green bile secondary to those from lactose broth directly were almost identical for the two series (98.53 and 98.60 per cent).

It appears, therefore, that from the figures for the aggregate results secured from these 2 series of examinations, fuchsin broth yielded results practically as satisfactory as those obtained from the use of MacConkey broth. Both media, compared with lactose broth, were of some value in reducing the number of presumptives to be confirmed, although they permitted about as many coliform isolations as did the standard medium. Whether they would prove to be as satisfactory for the examination of finished waters is a question; because of the few coliform organisms contained in finished waters, only the results from a very large number of samples of such waters can determine definitely the effect of the inhibiting agents employed in these media. In any event, presumptives in either fuchsin or MacConkey broth must be confirmed, for when used for examination

TABLE III

Number of MacConkey Presumptives, Secondary Brilliant Green Bile Gas Positives and Coliform Isolations from Lactose Broth

	MacConkey Presumptives (Gas +)	Secondary Brilliant Green Bile (Gas +)	Coliform Isolations from Lactose Broth by Complete Confirmation of Lactose Broth or Brilliant Green Bile Gas Positives
New York	217	141	142
Toronto	134	127	100
Maryland	94	87	93
Quebec	406	359	361
	<hr/> 851	<hr/> 714	<hr/> 696

of American waters, they have not proved generally satisfactorily indications of the presence of coliform organisms.

On the other hand, it is evident from Table III that the presence of gas in brilliant green bile, following transfer from a lactose broth tube in which gas has been produced, indicates fairly accurately the presence of coliform organisms except in the Toronto laboratory where, of 127 brilliant green bile gas positive tubes, only 100 were shown (by confirmation directly from the primary lactose broth or indirectly from the brilliant green bile) to represent lactose broth primary tubes containing coliform organisms. It is probable, however, that a more intensive search would have shown the presence of gas in brilliant green bile to be a somewhat more reliable indication of the presence of coliforms in these Toronto waters than that furnished by these figures, for a varying proportion of coliform organisms usually escape the routine complete confirmation procedure.

The results secured from this comparison of MacConkey broth and lactose broth are somewhat similar to those reported by Atkinson and Wood⁸ in Australia. Working with untreated waters from various sources, they planted 5 portions of each of 3 dilutions of 34 different samples into the 2 media, confirming completely in accordance with American methods (ex-

cept in the use of MacConkey agar instead of E.M.B. or Endo agar) all tubes in which gas was produced. The results were as follows:

MacConkey Broth		Lactose Broth	
Presumptives	Con- firmed	Presumptives	Con- firmed
216	174	305	247

With both media, 81 per cent of the presumptives were successfully confirmed. But lactose broth yielded 42 per cent more coliforms than did MacConkey broth; and in 27 of the 34 samples examined, the coliform count resulting from the use of lactose broth was the greater of the two. The authors conclude: "Thus the British Standard Method using MacConkey broth without confirmation is not suitable for the examination of the type of water tested here, on account of the inclusion of false positives and the lack of sensitivity of the medium to the coliform group"; and they state that the method adopted for bacteriological analysis of Victorian drinking water is practically that given by the American Public Health Association (1933).

CONCLUSIONS

A limited study of the relative utility of MacConkey broth and lactose broth as primary media and of brilliant green bile as a confirmatory medium was undertaken by 4 different laboratories. The results may be summarized as follows:

1. The MacConkey presumptive (presence of gas within 48 hrs.) did not prove to be, in general, a satisfactory indication of the presence of coliform organisms. False presumptives (or at least presumptives from which such organisms were not isolated by means of the usual complete confirmation procedure) constituted 2, 20, 39, and 40 per cent of all MacConkey presumptives encountered by the Maryland, Quebec, Toronto, and New York laboratories respectively.

2. Complete confirmation of MacConkey presumptives yielded about as many coliform isolations as did like confirmation of the larger number of lactose broth presumptives, or of brilliant green bile confirmatory gas positives. The economy in number of presumptives to be confirmed obtained through the use of MacConkey broth, however, did not appear to surpass that which was secured in a previous study, through the use of fuchsin broth. The effect of the inhibiting agents employed in these two media upon coliform organisms that may be contained in finished waters has yet to be determined.

3. On the whole, the procedure employing lactose broth and confirmation (gas only) in secondary brilliant green bile appeared to yield more satisfactory results than the other procedures. In the Toronto laboratory, a

number of false positives were encountered in brilliant green bile as well as in MacConkey broth; but there also the procedure employing brilliant green bile, whether or not followed by complete confirmation, proved to be as satisfactory, or more satisfactory than that in which MacConkey broth was used.

REFERENCES

1. MacConkey, A., and Hill, C. A. Bile Salt Broth. A Simple Test for Faecal Contamination. *Thompson-Yates Laboratories Report*, IX, 1:151, 1901.
2. Savage, W. G. Neutral Red in the Routine Bacteriological Examination of Water. *J. Hyg.*, 1:437, 1901.
3. Makgill, R. H. The Neutral Red Reaction as a Means of Detecting *Bacillus Coli* in Water Supplies. *J. Hyg.*, 1:430, 1901.
4. *Reports on Public Health and Medical Subjects*, No. 71. The Bacteriological Examination of Water Supplies. Ministry of Health, London, England, 1934.
5. *Standard Methods of Water Analysis*, Eighth Edition, 1936. American Pub. Health Assoc., New York, N. Y.
6. Scott, W. M. Ministry of Health (London). Private communication.
7. Harold, C. H. H., Director of Water Examinations, Metropolitan Water Board. Private communication.
8. McCrady, M. H. A Practical Study of Procedures for the Detection of the Presence of Coliform Organisms in Water. *A.J.P.H.*, 27, 12 (Dec.), 1937.
9. Atkinson, N., and Wood, E. J. F. *Australian J. Exper. Biol. & M. Sc.*, 16:103. 1938.

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OUR SIXTY-EIGHTH ANNUAL MEETING

THE 68th Annual Meeting of our Association was held in Pittsburgh, Pa., that center of industry which is one of the wonders of the world. It is the first time that we have ever met in that great city, and it has been 42 years since we have met in Pennsylvania. Having been in Pittsburgh once, we fear that we will not be satisfied anywhere else. Registration went well over 2,400.

We had some foreboding about attendance owing to the European war. This led to a number of cancellations especially from our constituent and sister country, Canada; but things have turned out better in regard to attendance from that country than we dared to hope since at least 19 representatives met with us.

Canada:

Robert D. Defries, M.D., D.P.H., Toronto, Ont.
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 M. S. Loughheed, Winnipeg, Man.
 Ella Grant, Nurse, Toronto, Ont.
 John J. Heagerty, M.D., D.P.H., Ottawa, Ont.
 Gordon P. Jackson, M.B., D.P.H., Toronto, Ont.
 Norman MacL. Harris, M.B., Ottawa, Ont.
 Donald T. Fraser, M.B., D.P.H., Toronto, Ont.

From another constituent country, Mexico, two representatives:

Angel de la Garza Brito, M.D., C.P.H.
 Alberto P. Leon, M.D., M.P.H.

From Cuba five honored us:

Dr. Gaspar Agramonte, Cuban Navy, Havana
Dr. Moises Chappotin, Cuban Army, Havana
Raoul Cowley, Marianao, Cuba
Dr. Alberto Ricio, Cuban Epidemiologist, Havana
Dr. Charles Finlay

We were happy to have Dr. Agramonte, a nephew of Dr. Aristides Agramonte who was on the famous commission with Walter Reed; also Dr. Charles Finlay, son of Dr. Carlos Finlay who made experiments in regard to yellow fever and who furnished Walter Reed the eggs from which he reared his mosquitoes and got his final proof.

We had a number of engagements from our honorary members in England, but all of these had to be cancelled. However, we were fortunate in having from Finland, a county health officer, Dr. Niilo Erkki Leppo, and his wife. From Puerto Rico, Dr. Oscar Costa-Mandry; Japan, Dr. Takemune Soda, Assistant Professor, Faculty of Medicine, Taihoku University, Formosa, Japan; Hawaii, Mr. Robert Lam, Honolulu Health Department, and Thomas O. Frazier, Honolulu Health Department; Alaska, Marcia S. Hays, M.D., Juneau; Virgin Islands, Dr. Norman R. Sloan. There were a number of most interesting trips for which transportation was furnished by the Local Committee.

The scientific exhibits were somewhat limited owing to the lack of space. Without being invidious, we want to mention that among the best exhibits were that from Kips Bay-Yorkville Health Center of New York City, most cleverly constructed, showing the value of a preventive diet, and the Pittsburgh Industrial Health exhibit. The commercial exhibit was excellent in every respect.

The scientific program was unusually rich, so much so that one could not but wish for at least a dozen bodies to attend as many meetings simultaneously.

Needless to say the principal features were the meetings on Tuesday and Thursday evenings. At the first on Tuesday, we were graciously welcomed by Mayor Cornelius D. Scully, the Health Officer, Dr. I. Hope Alexander, and the president of the local medical association as well as other local organizations. We will not comment on the president's address as that will appear in December. Among the features was the Delta Omega lecture which initiated a series which it is to be hoped will be continued, followed by the presentation of the Sedgwick Memorial Medal. This was followed by a reception to President and Mrs. Abel Wolman and to President-elect Dr. and Mrs. E. S. Godfrey, followed by dancing, altogether a most enjoyable occasion. The banquet on Thursday night was all that could be asked for. The presentation of forty year membership certificates to Dr. Norman McLeod Harris and Mr. John Watson Alvord was made, and the Health Conservation Contest awards were announced, followed by dancing on the Urban roof which again gave great pleasure.

As usual there were a number of advance meetings of related or affiliated organizations besides the Sixth Health Education Institute, all of which were well attended. Of special interest was the meeting of the Pennsylvania Public Health Association with the Tri-State Food and Health Officials. Following a joint banquet, a very large gathering was addressed by Dr. Henry F. Vaughan and the Honorable Fiorella H. LaGuardia, Mayor of New York City.

Too much cannot be said of the courtesies of the Local Committee. Everything was done for the comfort and entertainment of everyone. A special feature,

new in our experience, was the lovely flowers furnished by the Women's Entertainment Committee, under the chairmanship of Mrs. David B. Ludwig, for all occasions and changes of floral decorations for all public meetings.

DENTAL FLUOROSIS AND DENTAL CARIES

FOR some 8 or 9 years past the presence of fluorine in water supplies has been attracting much attention, chiefly as a danger and as the cause of endemic dental fluorosis, or mottled enamel, which has been reported in some 300 communities in 23 states of the Union.

According to Dean,¹ this condition was first described by J. M. Eager² in a report from Naples under the name "Denti di Chiaie (Chiaie teeth)," so called from Dr. Stephano Chiaie, who first observed the condition in Italy, where it was ascribed to volcanic fumes in the air or dissolved in drinking water. Italian immigrants not infrequently consulted doctors in this country for the condition, which was "unlike any other dental disease."

Apparently nothing was done until 1916, when Black and McKay^{3,4} published a series of articles on the subject, Black describing it as "An Endemic Developmental Imperfection of the Teeth, Heretofore Unknown in the Literature of Dentistry." From that time until about 1932, the condition does not seem to have attracted much general attention. However, Black observed at that time some apparent relation between mottled enamel and dental caries. Other observations along this line were not abundant, but intensive work has been going on for 5 or 6 years, notably in the National Institute of Health and in some western states.⁵

The condition has been proved to be due to the use of water carrying toxic amounts of fluorides during the period of dental calcification. However, evidence has accumulated which indicates that a certain amount of fluorine in the water exercises some inhibitive action against caries, or, at least, that there is an inverse relationship between endemic dental fluorosis and dental caries. Many factors are involved but the careful plan followed in the study discussed here seems to have eliminated as many as possible of these.⁶

The four cities of Macomb, Quincy, Galesburg, and Monmouth, located near together in the flat country of North Central Illinois, were selected for comparison, and the examinations were limited to white children 12, 13, and 14 years old. The population in these four towns is very similar and they have approximately the same percentage of native white inhabitants—88–97. The location insures comparatively equal sunlight intensity.

In Galesburg and Monmouth the water supply contains from 1.7 to 1.8 parts per million of fluorides, whereas that of Quincy and Macomb has only 0.2 parts per million. Of 319 children in Galesburg and 148 in Monmouth, the number of carious permanent teeth per 100 children was 201 and 205 respectively, whereas of 112 children in Macomb and 306 in Quincy, the carious teeth were 401 and 633 respectively. There was twice as much dental caries in Macomb and more than three times as much in Quincy, where the water was practically free from fluorides, as at Galesburg or Monmouth. About 35 per cent of children examined in Galesburg and Monmouth were free from caries, while in Macomb and Quincy only 14 and 4 per cent respectively were free.

Another test was observation of interproximal, or smooth surface, caries for which the four superior anterior teeth of children who had used the city water supplies continuously throughout their lives were selected. In Galesburg and Monmouth, 2,718 surfaces examined showed an average of 0.59 carious lesions per 100 surfaces, whereas of 2,814 surfaces of children in Quincy and Macomb, there were 8.9 carious lesions per 100 surfaces, or 16 times as much.

An unusual feature of this investigation concerns the presence of *Lactobacillus acidophilus* which is believed by many to be a dependable index of the dental caries activity. Such examinations were made only at Quincy and Galesburg, where caries in permanent teeth amounted to 636 per 100 children in Quincy, 3.4 times the amount found in Galesburg, 189 per 100. The percentage of all acidophilus counts of 30,000 or over is also 3.4 times as high in Quincy as in Galesburg, possibly a coincidence, but an interesting finding in this general study.

This report, which does not pretend to be final, holds that from the epidemiological standpoint the difference in the water supplies must be considered the cause of the differences in the dental condition of the children examined. This points to the possibility of at least partial control of dental caries through the public water supplies. All studies of dental caries should be accompanied by complete chemical analyses of the domestic waters used, especially with regard to the comparatively rare elements.

REFERENCES

1. Dean, H. Trendley, and Elvove, Elias. *A.J.P.H.*, June, 1936.
2. Eager, J. M. *Pub. Health Rep.*, Nov. 1, 1901.
- 3, 4. Black, G. V., and McKay, F. S. *Dental Cosmos*, Feb., May, June, July, Aug., 1916.
5. Smith, Margaret Cammack. *A.J.P.H.*, June, 1935.
6. Dean, H. Trendley, Jay, Philip, Arnold, Francis A., McClure, Frank J., and Elvove, Elias. *Pub. Health Rep.*, May 26, 1939.

THE TOXICITY OF SELENIUM

IN a recent article¹ attention was called to the problem of selenium poisoning, the danger from which seems to be increasing through the use of spraying, irrigation, and certain industrial practices. While we know little of selenium poisoning in human beings, the deleterious effects on livestock and poultry have been proved.

The question has been under study at the National Institute of Health for some time. Their latest report² is of great interest as showing the relation between the composition of the diet and the danger of poisoning. In all of their experiments a prominent characteristic of selenium poisoning has been in evidence; namely, the great variation in individual as well as in species susceptibility. Many experiments have been made in trying to find the cause of this. It now seems certain that as far as rats go the toxicity of selenium taken in food is largely determined by dietary factors. A quantity of selenium which proves highly toxic and damaging to the tissues when given in a diet low in protein and high in carbohydrate is only slightly or not at all harmful when fed in another diet high in protein and low in carbohydrate. In other words, all the available evidence indicates that the toxicity of naturally occurring food selenium is determined to a great extent not so much by the level of intake of selenium, as by the ratio between protein and selenium in the diet. While 10 parts per million of selenium, a ratio of 1 per cent protein in the diet to about 30 micrograms of

selenium per 100 grams of diet, is of very low, if any, toxicity, a ratio of 1 per cent protein to 100 micrograms selenium per 100 grams of diet under the same conditions is dangerously toxic. A diet low in protein and high in fat shows some protective action against selenium poisoning, probably due to the protein sparing action of the high fat content.

Is it possible that these findings may help to explain the lack of cases of poisoning from selenium in human beings?

REFERENCES

1. Manville, Ira A. The Selenium Problem and Its Relationship to Public Health. *A.J.P.H.*, 29, 7:709 (July), 1939.
2. Smith, M. I. The Influence of Diet on the Chronic Toxicity of Selenium. *Pub. Health Rep.*, 54, 31:1441 (Aug. 4), 1939.

BOOKS AND REPORTS

Fundamental Principles of Bacteriology with Laboratory Exercises—By A. J. Salle. New York: McGraw-Hill, 1939. 679 pp. Price, \$4.00.

The author states that this book has been designed for those beginning the study of bacteriology and particularly those who intend to specialize in it. It is a "textbook on fundamentals." It differs from others in that it is written as a combination textbook and laboratory manual, the experimental portion being woven into the manuscript under the proper chapters. "The textbook material goes hand in hand with systematically arranged laboratory procedures." The experimental material has been designed to meet the fundamental requirements of students not only in bacteriology but in "the various divisions of agriculture, forestry, home economics, sanitary engineering, physical education, hygiene, public health, etc.," and this is expected to be covered in a one semester course.

It can be seen from what the author says that his outlook is ambitious. To a large extent he has succeeded in his objective and has produced a useful book, especially as a reference. We fear that much of the material is heavy for an elementary course while in other respects it is not complete enough for the specialist. It is presupposed that the student will have a wide knowledge of inorganic and organic chemistry and there is much greater emphasis on chemistry than is found in other textbooks. While all knowledge is useful and one hesitates to criticise on this ground, it must be pointed out that the

book is crowded throughout with difficult chemical formulae, many in graphic form. It is a question of proportion. Under protein decomposition, 8 solid pages are given to chemical formulae, under classification of enzymes 13 pages, under biological strains 5 pages. There are 8 pages given to the preparation of stains and solutions and 10 pages to formulae and directions for making culture media.

The book is well written and clear. It can be recommended for reference but we doubt if it is well adapted for courses as usually given in any schools, medical, agricultural, or others, hence its adoption would necessarily lead to reorganization of instruction.

We like particularly the first two paragraphs of the Preface quoted from John R. Wilbur, which states what a preface should be as against what it usually is. The illustrations are abundant and the make-up is good.

MAZÛCK P. RAVENEL

An Introduction to Modern Statistical Methods—By Paul R. Rider. New York: Wiley, 1939. 220 pp. Price, \$2.75.

There are two ways of advancing the knowledge of a subject: (1) by gathering additional data about it, and (2) through a better understanding of the facts which are at hand.

The book under review is intended to help in the second way. It is written for whoever wants to use numerical data, without regard to what these data represent. It may be of help to health workers who feel they would like to have an advanced knowledge

of statistical methods, but it is hardly the book for those who want more information concerning the steps commonly employed. It says nothing of the need of a clear understanding of the limitations which should be placed upon numerical data, of the need of scrupulous accuracy in the collection of the facts which are to be used statistically, of the danger of drawing misleading inferences from a too limited supply and of the risk of attaching too much importance to statistical statements simply because they are statistical. Such matters are not within the scope of this volume. They belong to the kindergarten training of those who aspire to use such methods as are described here.

For those who have some knowledge of statistical methods already and want to improve and extend it in accordance with the best present-day practice, this book will be found to be a useful and authoritative guide.

GEORGE A. SOPER

Health Officers' Manual—By J. G. Geiger. Philadelphia: Saunders, 1939. 148 pp. Price, \$1.50.

Helpful quiz compends have often grown out of the necessities of administrative organizations. The manual from Dr. Geiger's hand seems to be no exception. For new employees entering a city health department without any vocational experience or training or familiarity with functions or duties to be performed, his little book will show him his way about.

As would be expected from its authorship and the city of origin the form of organization presented reflects the characteristics of the dual rôle of the San Francisco Department of Health under which hospital and other medical services for the sick are included as they are in Philadelphia and a few other cities in the United States. This does not illustrate approved health

department practice. Nor is it usually accepted that the issuance of food supplies to undernourished children should be a regular function of the health department.

Among the excellent and convenient features of this manual are the educational charts illustrating the natural history of communicable diseases. Also, one notes with satisfaction that births are expected to be reported within twenty-four hours, a much desired improvement over current city health practice in the United States.

This is not a book of general value for physicians or for graduates in public health, but is a convenient summary of the services of one of our best health-administered cities which lay groups of teachers and social or welfare workers on the west coast will find useful.

HAVEN EMERSON

The Clinical and Experimental Use of Sulfanilamide, Sulfapyridine, and Allied Compounds—By Perrin H. Long, M.D., and Eleanor A. Bliss, Sc.D. New York: Macmillan, 1939. 319 pp. Price, \$3.50.

The prominence which sulfanilamide and its allied compounds has rather suddenly attained during the past six years and the promise of their value in therapeutics in the future renders the intelligent clinical use of these compounds a matter of prime importance. The authors, as prominent workers in this field, have reviewed the investigations in this newest development in chemotherapeutics, and have outlined their own experiences. In eight chapters, they have covered the historical aspects of the subject; the chemotherapy of experimental bacterial infections; the experimental toxicity and comparative pharmacology of the several derivatives; the mode of action of the drugs; their clinical use; and finally the clinical toxic manifestations.

The historical development of the

subject is well handled and forms an interesting chapter, which should serve as a basis for an important addition to the general history of medicine. The chapters dealing with the experimental use of the drugs, dealing with many controversial subjects, are unavoidably concerned with many differences of opinion. The sections on the clinical use of the several derivatives cover most of the indications, and should be of material benefit to those not cognizant of the more outstanding papers in this field, although adding little to what has already been written. In these chapters, a well-timed definition of the several derivatives is given to clarify the confusion created by the multiplicity of trademark names attached to the various compounds. Wisely, too, is included a rather complete description of the use of the drugs in gonococcal infections with adequate discussion of the altered difficulties in the evaluation of criteria of cure of gonorrhea in the adult, with implications of the sociological importance.

The dangers involved in the use of these drugs are outlined in the section on clinical toxicity, which states very clearly the author's opinions of the significance of the various toxic manifestations, which will clarify this important phase of the subject to those unacquainted with it. Knowledge of the significance of the toxic manifestations is important not only in preventing the serious reactions which sometimes occur, but also in being able to proceed with what may be very important therapy in face of some of the drug symptoms, which are now known not to be contraindications. The importance of using these very potent, but potentially dangerous, compounds only under strict medical supervision is intimated in the chapter on clinical toxicity.

Throughout, the authors have upheld rather strictly their own interpre-

tations of both the experimental and clinical use of the compounds, even on those subjects which, at the time of writing, were quite controversial, and their criticisms of opposing viewpoints seem, at times, unwarrantedly and needlessly violent. As must be expected in a monograph written so early on a new and rapidly developing subject, much is unsettled, and conclusions cannot be too definite. Likewise, even in the short space of time elapsing between the writing and the publication of the book, many important contributions have been made, particularly in regard to sulfapyridine, but at this time the book appears to add a definite contribution to the general intelligent use of these important compounds. An extensive bibliography is included and the book is well indexed with both authors and subjects.

HENRY L. BARNETT

You're the Doctor—By Victor Heiser, M.D. New York: Norton, 1939. 300 pp. Price, \$2.50.

This is a book on personal hygiene based on the experiences of the author. The dominant note is that health depends more largely on correct eating than on any other single factor. Indeed, the author calls it the pivot about which everything else revolves. He explains that his own personal health is so good for a man of his age that he constantly has to explain what he has done to bring it about. This is a very weak argument as has been proved many thousand times. All of us can remember Fletcher and his fads, yet the world did not adopt his ideas about much chewing.

Each chapter has a name which takes the fancy and excites curiosity. "Where'er I Roam" is a survey of the different foods which the author has eaten in practically every part of the world. Perhaps the best chapter is the last, "A Merry Heart Doeth Good Like

a Medicine." There are many anecdotes collected from practically every part of the world. The advice given is generally sound. The book is interestingly written and will probably appeal to the public. It is being pushed on the reputation of the author's first book, *An American Doctor's Odyssey*, and the jacket gives some of the ordinary blurb which unfortunately disfigures so many books.

Some of the statements lack exactness. For example, the story of Pasteur's discovery regarding chicken cholera on page 55. Anyone reading this is entitled to believe that the author is speaking of the vibrio of Asiatic cholera and not the entirely different germ of chicken cholera. The lay public for whom he is writing will not recognize the difference and is entitled to a correct statement. The book is well printed and put together.

MAZYCK P. RAVENEL

Community Health Organization
—*Ira V. Hiscock, Editor (3rd ed.)*.
New York: Commonwealth Fund, 1939.
318 pp. Price, \$2.50.

Hiscock has again given us a thoroughly revised and up to the minute edition of this valuable book. It is a work which all who toil in the field of public health have learned to welcome because it so gently and effectively broadens the vision, points out the challenges and opportunities of the coming decade, and establishes an active discontent with any *status quo* or *laissez faireism*.

This volume follows in general outline the editions of 1927 and 1932 and has its basis in the continuing work of the Committee on Administrative Practice of the American Public Health Association. It leaves the distinct impression that a community health organization which might be considered fairly good as of today or yesterday cannot rest on any laurels, for there is

much to be done, new work to be undertaken, with the goal well ahead, out of any immediate reach, if not perhaps even out of sight.

The reader sees clearly that quality of public health service is as important as quantity, in all the accepted usual range of community health work, such as venereal disease, tuberculosis, and general communicable disease control; school hygiene, the laboratory, and public health nursing. He lays down the book knowing full well that there must be a bold official approach to a more adequate provision for medical care. The editor makes it plain that in this and all health fields success will be most striking where there is a better knit and more active teamwork among many community agencies that heretofore have merely been on speaking terms with each other.

Recreation, housing, hospital planning, real industrial hygiene, all find their place in this helpful and stimulating new edition. Numerous type-specimen communities are there to beckon us on. No doubt there will be health officer readers who will water at the mouth over the suggestion of a month's vacation for health department staff members, and at some of the upper salary ranges as given at the chapter ends—perhaps enough to go out and work hard for some of these obvious desiderata.

HUNTINGTON WILLIAMS

Social Psychology of Adolescence
—*By E. DeAlton Partridge*. *New York: Prentice-Hall, 1938.* 361 pp. Price, \$2.75.

The author introduces his subject with the premise that, "since every agency dealing with young people approaches them in some kind of social setting, the significance of this social setting must be recognized if we are to understand the behavior of young people." He concludes that, "if one

accepts the point of view of social psychology, then the use of groups in treating behavior difficulties is of utmost importance. Since behavior arises out of the relationships surrounding the individual, the changing of behavior depends on a change in these relationships."

Between his premise and his conclusion the author surveys what he considers the more significant phases of sociology and psychology as they relate to young people in modern society. To be most fruitful, he says, the study of the adolescent must be the study of human beings growing up; the consideration of the process by which each individual becomes a social being.

Social psychology is by no means a new avenue of approach to the problems of youth. This book differs from many of its predecessors in the dynamic qualities of the organismic, or Gestalt, point of view from which it is written and in its practical suggestions for utilizing present, everyday social contacts and aspirations as means of working out the solutions to the problems of the normal adolescent as well as those of the "problem child" and the delinquent.

The book is addressed "to those who are working with young people." To those who have done considerable reading or have had wide experience in this field much of the material may appear elementary in nature. To all, however, the book will bring a freshness and vitality which make the reading of it a pleasure, and a positive, constructive approach which should be an inspiration to even the most experienced worker.

FREDERICK W. BROWN

Your City—By E. L. Thorndike.
New York: Harcourt, Brace, 1939.
204 pp. Price, \$2.00.

This book attempts to give a rating to the larger cities (some 310 of them) in the United States, on the basis of

what is called "goodness," and suggests that any city may be appraised by applying the same standards described.

Appraisal is not a new thing and has been applied quite extensively in the last few years to public health activities and facilities. When one is measuring the extent of services or the facilities available, the appraisal may not be overdifficult, but when an attempt is made to evaluate the quality rather than, or in addition to, the quantity, one is confronted with some real difficulties. In attempting to appraise not simply one feature of a city, but all features of any importance, the task becomes stupendous. Who is to determine just what is to be included and what excluded, and what relative weight is to be given to each item in determining the total score or comparative ranking? Thorndike has attempted an appraisal of "goodness" on the basis of 37 items.

While there are a number of characteristics that we would expect to find in any "good" city just as in any good person, it is quite questionable whether the number of automobiles or radios in use, or the number of beauty parlors, or many other items, can be taken as criteria by which to measure a city as to its wealth, progress, or desirability as a place in which to live. The author recognizes this.

The study may be interesting for those who wish to apply not all the 37 criteria, but the "Ten-Item City Yard Stick" (page 153) to their own city.

The book contains a great deal of valuable advice to those who would improve their city, and this advice rather than the more intricate variable and coefficients will be most likely to impress city administrators.

JAMES WALLACE

Social Welfare Laws of the Forty-Eight States—By Wendell Huston,

Compiler. Seattle: Wendell Huston Co., 1937. Loose leaf binding, 1,397 pp. Price, \$12.50.

This third edition, loose-leaf volume, brings up to date of time of publication the main social legislation, containing a vast amount of material well organized into a comprehensive volume. To public relief laws have been added labor laws. Following details of the Federal Social Security Act (with skeleton index), are given the laws of each state preceded by a useful index. While legislation relating to public health in the states is incomplete, the relative completeness of other phases of social legislation and the plan of arrangement make this volume a useful reference, especially for the administrator.

IRA V. HISCOCK

Un pays qui s'abandonne devant un danger qui grandit: l'alcool—By Dr. Jacques Parisot and Dr. Gabriel Richard. Nancy-Paris-Strasbourg: Berger-Levrault, 1939. 39 pp.

This is a study of the effects of alcohol from the social aspect, and concerns France primarily. The World War led to measures which greatly diminished the amount of alcohol consumed as a beverage. In less than 3 years after the Armistice the restrictive laws began to be attacked with the result that a greatly increased consumption of alcohol is now in evidence. The authors bemoan the fact that France leads in the annual per capita consumption—160 liters against 97 for Italy, 88 for Spain, 44 for Switzerland, and much less for other countries.

The factors chiefly responsible are: (1) excessive number of dramshops, (2) too much leisure, due to the 40 hour work-week, (3) privileges granted to distillers of brandy for private use, (4) use of particularly toxic drinks similar to, and the substitutes for, absinthe.

As remedial measures the authors

support the program of The Academy of Medicine which has been sent to successive administrations for 30 years: (1) modification or abolition of the privileges granted to private brandy distillers, (2) limitation of the number of dramshops, (3) increasing the tax on alcoholic drinks and suppression of those made with aniseed, or a reduction of their toxicity, (4) establishment of recreation centers in which only non-alcoholic beverages, fruit juices, and fruits in every form are served.

Ways and means are discussed. Some of the problems are common to all countries, some peculiar to France.

The arguments are well presented from a scientific standpoint, and the language is clear.

MAZÛCK P. RAVENEL

An Industrial Department of Health—By Northwestern University Medical School, Department of Industrial Medicine. Bull No. 9. Chicago: Northwestern University, 1939. 56 pp. Price, \$2.00.

This *Bulletin* attempts to put into brief manual form the opinions of many authors as to what constitutes adequate medical service in industry. It is carefully prepared, purposely brief but comprehensive.

Some 38.78 per cent of the entire population of the United States depends for a livelihood on a job in some industrial establishment (1930 Census). While sickness does not usually have a direct relation to occupation, it has tremendous economic results in decreased efficiency of workmen as well as otherwise. Management and labor are agreed that the maintenance of good health is of first importance. The medical and hygienic aspects are supreme but require the services of those in several specialties. Some 80 to 90 per cent of industrial groups are served by doctors in ordinary private

practice and the situation demands more or less special training so that recent graduates in medicine must serve a further apprenticeship of some kind. As a general rule physicians serving industry on a part-time basis is best. Outside of especially hazardous industries where the necessity of frequent examinations and check-ups is obvious, it is desirable that all employees be given a physical examination at least once every 3 years. A routine Wassermann is recognized as a valuable public health procedure but is not a prerequisite for employment. The bases for employment rejection are carefully outlined.

There is an occupational health hazard of some degree in almost every manufacturing process and the medical department must designate all conditions which adversely affect the health of workers. Most occupational health hazards are well known and easily recognized, also solvable by ordinary intelligence. General hazards are usually of major importance although specific hazards may be no less important for certain individual employees. Close coöperation with the state department of health is essential. Treatment is ordinarily a function of the individual or the community. Among all types of sickness disability, none requires more experience and knowledge than the differential diagnosis of an occupational disease, and it is imperative that medical service shall be competent in this field.

The significance of socialized medicine and insurance schemes which are rapidly extending over the country is given close comment. Attention is called to official governmental reports suggesting that some 40,000,000, or nearly one-third of the population, are receiving inadequate medical service.

Shop committees upon which labor is represented are necessary. The closeness of workmen to given local

problems and their intimate knowledge of men, machines, and danger points make for a high degree of effectiveness.

The reviewer finds few advocacies and statements which he would not endorse as outlined.

EMERY R. HAYHURST

When Social Work Was Young—
By Edward T. Devine. New York: Macmillan, 1939. 163 pp. Price, \$1.75.

This book records personal recollections of activities and conditions associated with the development of social work during the past 40 years, but especially between 1890 and 1910, including brief descriptions of the contribution of leaders in the movement. A chapter on prevention of tuberculosis, describing the significant rôle played by the Charity Organization Society in the advancement of educational and preventive measures and in the establishment of organizations will be of particular interest to public health workers.

IRA V. HISCOCK

Guiding Principles for Studies on the Nutrition of Populations—
By Dr. E. J. Bigwood. New York: Columbia University Press, 1939. 281 pp. Price, \$1.50.

The League of Nations Technical Commission on Nutrition has again sponsored a useful and enlightening publication. A complete and well outlined presentation of the points that should be stressed in conducting nutrition surveys of populations is given in this monograph. Nutritionists and dietary specialists will find this booklet of value in surveys of any size since the methods are applicable not only to groups of a few persons but to whole nations as well. A complete nutrition survey of any group of persons calls for an investigation of their food consumption. This purpose is adequately served in Part I in which are discussed

the types, methods and scope of surveys; the investigating staff; classification of foodstuffs; physiological value of the diet; economics; and statistical considerations.

Part II deals with how the state of nutrition should be studied in relation to diet. This section includes discussion of somatometric, clinical, and physiological tests and gives examples of the various types of surveys in a number of countries.

The author presupposes no advanced knowledge on the part of the reader and discusses nutritive principles, tests, and statistics with such clarity that both the student and the experienced worker will benefit.

An appendix contains numerous examples of record forms and tables used in the leading countries where dietary surveys have been made. The bibliography is efficiently up-to-date.

ARTHUR S. LEVINE

BOOKS RECEIVED

- LABORATORY MANUAL FOR GENERAL BACTERIOLOGY. Compiled by George L. Peltier, Carl E. Georgi and Lawrence F. Lindgren. 2d ed. New York: Wiley, 1939. 277 pp. Price, \$2.00.
- EPIDEMIOLOGY IN COUNTRY PRACTICE. By William Norman Pickles. Baltimore: Williams & Wilkins, 1939. 110 pp. Price, \$2.50.
- MATERNAL CARE AND SOME COMPLICATIONS. By F. L. Adair, Editor. Chicago: University of Chicago Press, 1939. 194 pp. Price, \$1.50.
- TEACHING WHOLESOME LIVING IN THE ELEMENTARY SCHOOL. By Alma A. Dobbs. New York: Barnes, 1939. 304 pp. Price, \$2.50.
- ATTAINING WOMANHOOD: A DOCTOR TALKS TO GIRLS ABOUT SEX. By George W. Corner. New York: Harper, 1939. 95 pp. Price, \$1.00.
- A HANDBOOK OF ELEMENTARY PSYCHOBIOLOGY AND PSYCHIATRY. By Edward G. Billings. New York: Macmillan, 1939. 271 pp. Price, \$2.00.
- BUTTER. By C. C. Totman, G. L. McKay and C. Larsen. 4th ed. New York: Wiley, 1939. 472 pp. Price, \$3.50.
- BULLETIN OF THE HEALTH ORGANIZATION. Vol. VIII, Nos. 1-2. This Bulletin starts with the Annual Report of the Health Organization of the League of Nations. New York: Columbia University Press, 1939. 386 pp. Price, \$1.30.
- 202 COMMON HOUSEHOLD PESTS OF NORTH AMERICA. By Hugo Hartnack. Chicago: Hartnack Publishing Co., 1939. 319 pp. Price, \$3.75.
- ELEMENTS OF SANITATION. By Edw. S. Hopkins, Editor. New York: Van Nostrand, 1939. 435 pp. Price, \$4.00.
- FOOD CONTROL: ITS PUBLIC-HEALTH ASPECTS. By James Houston Shrader. New York: Wiley, 1939. 513 pp. Price, \$4.00.
- THE HEALTH INSURANCE DOCTOR. HIS RÔLE IN ENGLAND, DENMARK AND FRANCE. By Barbara N. Armstrong. Princeton: Princeton University Press, 1939. 264 pp. Price, \$3.00.
- HOW TO KEEP WELL. By Irving S. Cutter. Chicago: Chicago Tribune Public Service Office, 1939. 76 pp. Price, \$28.
- VENEREAL DISEASES: DIAGNOSIS, TREATMENT AND LABORATORY METHODS. Published and distributed by the Department of Pensions and National Health, Toronto, Canada, 1939. 93 pp.
- THE CHILD IN THE HOME. By Leila Wall Hunt. New York: Prentice-Hall, 1939. 259 pp. Price, \$2.50.
- A TEXT-BOOK OF OCCUPATIONAL DISEASES OF THE SKIN. By Louis Schwartz and Louis Tulipan. Philadelphia: Lea & Febiger, 1939. 799 pp. Price, \$10.00.
- THE PSYCHOLOGICAL ASPECTS OF PEDIATRIC PRACTICE. By Benjamin Spock and Mabel Huschka. New York: Reprint by New York State Committee on Mental Hygiene of the State Charities Aid Association by courtesy of the Appleton-Century Co., 1939. 154 pp. Price, \$25.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Finding Venereal Infections—Eminently sound and practical is this 15 year old V. D. case finding program which is recounted in matter-of-fact detail without fanfare. In at least one state, then, this essential work has gone on unobtrusively, year after year, even though some recently inaugurated epidemiologic projects have been reported with all the innocent enthusiasm of a Columbus bumping into a new world.

CASSELMAN, A. J., and CADWALLADER, A. Venereal Disease Contact-Tracing in Camden, New Jersey. *Ven. Dis. Inform.* 20, 7:185 (July), 1939.

British Attitudes on Social Medicine—To the question, "would a general medical service benefit the nation?" most (British) general practitioners would say "yes," says this ex-secretary of the B. M. A. who also says "yes." At the present time a complete medical service is quite out of reach of the great majority, and charity is not the solution of the problem. "Yes" says a medical officer of health. "Yes" said the discussants.

COX, A., and SCOTT, J. A. Would a General Medical Service Benefit the Nation? *J. Roy. Inst.* 2, 9:537 (Sept.), 1939.

For the Prevention of Shoulder Chips—Gold is sometimes found in unusual places. Here in an unlikely spot the health worker, whatever his job may be, will find some pure gold. True, the discussions are concerned with the water works and John Q. Public, but substitute whatever project may be your particular niche and you'll find the words of wisdom equally applicable.

CRIST, M. L. Public Relations. *J. Am. Water Works Assn.* 31, 8:1308 (Aug.), 1939.

Selling Health in a Skeptical Market—It is foolish to assume that healthy people generally are interested in abstract health. To be effective our efforts to influence health behavior must be individualized in terms of specific personal or group needs and aspirations. To recognize the limitations of our educational procedures may cause a better selection of methods, wisely concludes this author who must have come from Missouri.

DERRYBERRY, M. How to Influence Health Behavior of Adults. *Health Officer* 4, 3-4:114 (July-Aug.), 1939.

Primary Tuberculosis Is Protective—Evidence is presented to show that tuberculin reactors are less likely to develop tuberculosis when later exposed to infection than are those who are tuberculin negative.

FLAHIFF, E. W. The Occurrence of Tuberculosis in Persons Who Failed to React to Tuberculin, and in Persons with Positive Tuberculin Reactions. *Am. J. Hyg.* 30, 2:69 (Sept.), 1939.

Cement Dust's Bark Worse Than Bite—Compared to other dusty industries the hazard in cement manufacture is trivial. The incidences of tuberculosis and other chronic infections of the lungs were found to be less than those in the general population. Evidently prolonged inhalation of cement dust has no unfavorable influence upon tuberculosis.

GARDNER, L. U., *et al.* Survey in Seventeen Cement Plants of Atmospheric Dusts and their Effects Upon the Lungs of Twenty-two Hundred Employees. *J. Indust. Hyg. & Toxicol.* 21, 7:279 (Sept.), 1939.

Where Syphilis Will Soon Be Running Out of Disguises—Can you imagine any public health periodical being genuinely entertaining as well as informative? This review of recent statements should give rise to several broad grins—which is some kind of a record.

HARPER, C. A. Wisconsin's Health. State Board of Health Bull. 6, 15:3 (July-Sept.), 1939.

Eating Habits in the Orient—Observing the course of nutritional deficiency diseases around the world, this author has a wide background of unique and dramatic experiences with which to illustrate the universal damage done by defective diets.

HEISER, V. G. The Influence of Nutrition on the Diseases of Middle and Old Age. Sci. Month. 49, 4:304 (Oct.), 1939.

Curing TB. Individually and Socially—Collapse therapy for the tuberculous is not only an invaluable therapeutic measure, but it has a wide public health significance as well. Just as it offers the patient his best chance, so it offers the community its best protection. Hence health officials have an immediate interest in the wide extension of this measure.

HRUBY, A. J. Collapse Therapy of Tuberculosis. Am. Rev. Tuberc. 40, 3:255 (Sept.), 1939.

Effective Water Purification—From this excellent symposium on safety of public water supplies, one gathers that the number of outbreaks of water-borne disease are not due to inherent weaknesses in purification methods but in the failure to utilize standard procedures. A number of extremely practical questions are raised, and assured by a succession of authorities in this field.

NORCOM, G. D., *et al.* Symposium on Water Quality. J. Am. Water Works Assn. 31, 9:1475 (Sept.), 1939.

Who Was Sick and Why—How the National Health Survey was carried out and who did it, is explained in this paper which introduces a series of special reports, to be issued in the near future, on illness and medical care in relation to age, economic status, and employment; frequency of accidents in the home, in employment and on the highway; and adequacy of maternity services, status of housing, etc.

PERROTT, G. St. J., *et al.* The National Health Survey. 54, 37:1663 (Sept. 15), 1939.

Our Great Microbiologist—An appreciation of a distinguished American medical scientist by a French colleague, equally distinguished, constitutes a valued supplement to all that has been written about the man we all have long revered.

RAMON, G. WILLIAM HALLOCK PARK. J. Immunol. 37, 3:179 (Sept.), 1939.

Minimum, Adequate, Optimal Standards—We are reminded by this paper of the vulnerability of easy assumptions. Here in an institution where boys on an "adequate" diet, including the sacred quart of milk, together with fair amounts of basis foods, and these boys were found to be mostly within "normal" weight ranges. But when bananas were given as supplementary feeding to half the boys they made consistently better growth and development by every measure of physical status. Most significant differences were in blood ascorbic acid.

ROBERTS, L. J., *et al.* The Supplementary Value of the Banana in Institution Diets. J. Pediat. 15, 1:25 (July), 1939.

Measuring Diphtheria Prophylaxis Values—What is the best statistical method of checking efficiency of active immunization against diphtheria? What are the severity and clinical typology of diphtheria which occur in immunized children? For answers read this Chicago study which comments on un-

critical, but common, statistical assumptions.

SECKEL, H. P. G. Prevention of Diphtheria. *Am. J. Dis. Child.* 58, 3:512 (Sept.), 1939.

Teamwork—If the health officer will tell the teacher exactly what he would like to have his public believe and support, the school teacher ought to be able to work out the educative processes that will start school children on the road to believing and doing. How the two may work together is the subject of a provocative discussion.

SHEPARD, W. P. Sharpening the Focus in Health Education. *J. Health & Phys. Ed.* 10, 7:378 (Sept.), 1939.

Health Services for Tomorrow—Health articles are sometimes found far from their usual home in the scientific press these days. In this consumer's publication you may read a paper forcefully presenting the most telling arguments for a complete national health service. Let's forget the humanitarian reasons, urges the author, and turn our minds to the Nation's sickness bill of 10 billions. The capital value of preventable deaths, he says, is 6 billions.

SIGERIST, H. E. The People's Health. *Consumers' Union Reports* 4, 9:17 (Sept.), 1939.

Cancer Statistics — Reviewing British cancer statistics the author finds that the increasing crude death rates disappear (in women) when allowance is made for increasing age of the population. But the increase in males which defies age group correction, when considered by sites of the disease, suggests that the incidence of cancer of some organs may actually be increasing.

Here are some promising lines of approach.

SMALLMAN, A. B. The Cancer Problem. *J. Roy. Inst.* 2, 9:555 (Sept.), 1939.

Diver's Diseases — Apparently nature intended man to keep out of the water, else she would have provided him with selfclosing nostrils and ears, and fixed him up with a better temperature-control apparatus. This being the case, you had better respect the limitations of your physical equipment. What you can do to protect yourself is considered briefly.

TAYLOR, H. M. Otitis and Sinusitis in the Swimmer. *J.A.M.A.* 113, 10:891 (Sept. 2), 1939.

Wholesale Tuberculosis Examinations—British experience in mass X-raying by means of minicam photographs of the image on a fluorescent screen indicates that the method is both practical and inexpensive. A hundred and more cases per hour at an expense of about one cent each is reported.

THOMAS, A. R. Mass Radiography. *Pub. Health* 52, 12:1939 (Sept.), 1939.

Cutting the Toll of Congenital Syphilis—If, as the author says, "Every syphilitic baby is a failure of maternal education," and each year 60,000 syphilitic babies are born in addition to 25,000 stillbirths, then maternal education appears to be enjoying plenty of failures. As there are at least a million potential mothers infected with syphilis it would seem that health officers and educators have a job ready-made for them.

VONDERLEHR, R. A. Maternal Education, the Root of the Congenital Syphilis Problem. *Health Officer* 4, 3-4:118 (July-Aug.), 1939.

ASSOCIATION NEWS

OFFICERS, 1939-1940

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The Annual Meeting in 1940 will be held in
Detroit, Mich.

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The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

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Harold S. Hopley, B.S., Cheriton Point, Montoursville, R. D., Pa., Sanitarian, State Dept. of Health

Industrial Hygiene Section

Franklin J. Halpin, M.D., Surgeon, U.S.P.H.S., 2400 16th St., N.W., Washington, D. C., Medical Director, U. S. Compensation Commission

John Safford Wiley, M.S.E., State Board of Health, Indianapolis, Ind., Assistant Engineer, Bureau of Industrial Hygiene

Food and Nutrition Section

Lawrence L. Little, M.S., 3320 N.W. 13th St., Oklahoma City, Okla., Laboratory Technologist, Sterling Milk Products Co.

Ethel Austin Martin, National Dairy Council, 111 N. Canal St., Chicago, Ill., Director of Nutrition Service

Child Hygiene Section

Charles E. Presnell, D.D.S., M.S.P.H., State Health Dept., Jefferson City, Mo., Assistant State Dentist

Earl H. Ridgeway, O.D., 140 W. State St., Trenton, N. J., Optometric Consultant, State Colony, New Lisbon, N. J.

Public Health Education Section

Elizabeth H. Bohnenberger, State Board of Health, Jacksonville, Fla., Director, Bureau of Health Education

Margaret C. Donaldson, A.B., 581 Chestnut St., Meadville, Pa., Executive Secretary, Crawford County Tuberculosis Society

John E. Farrell, A.B., 106 Francis St., Providence, R. I., Executive Secretary, Providence Medical Assn.

Ira E. Foutz, 311 S. Juniper St., Room 507, Philadelphia, Pa., Assistant Executive and Publicity Secretary, Pennsylvania Tuberculosis Society

Jean Henderson, P. O. Box 210, Jacksonville, Fla., Public Relations Consultant, State Board of Health

Milton Rose, M.D., Laboratory of Hygiene, University of Pennsylvania, Philadelphia, Pa., Visiting Lecturer in Public Health, Univ. of Penna. Medical School

Harold W. Slocum, A.B., 348 College St., Burlington, Vt., Executive Secretary, Vermont Tuberculosis Assn.

Public Health Nursing Section

Gertrude Aufranc, R.N., M.A., County Court House, Mexico, Mo., Orthopedic Field Nurse, State Service for Crippled Children

Milada C. A. Botten, 1100 Donaldson Bldg., Minneapolis, Minn., Executive Secretary and Registrar, Minneapolis Nurses Assn.

Winifred Devlin, B.S., R.N., Michigan Dept. of Health, State Bldg., Lansing, Mich., Regional Supervisor

Frances A. Harris, R.N., 367 N. 21st Ave., Phoenix, Ariz., Public Health Nurse, State Board of Health

Lois L. Owen, Dept. of Public Instruction, Harrisburg, Pa., School Nursing Adviser

Rosemary Phillips, R.N., B.S., 7521 Byron Place, Clayton, Mo., Director of Nurses, St. Louis County Health Dept.

Epidemiology Section

Vlado A. Getting, M.D., M.P.H., 11 Perkins Square, Jamaica Plain, Mass., Technical Director, Mosquito Survey, State Dept. of Public Health

George H. Hodel, M.D., 1853 Park Drive, Los Angeles, Calif., Social Hygiene Physician, Los Angeles County Health Dept.

James H. Lade, M.D., State Office Bldg., Albany, N. Y., Medical Consultant in Syphilis Control, State Dept. of Health

Elroy F. McIntyre, M.D., C.P.H., State Capitol Bldg., Santa Fe, N. M., State Venereal Disease Control Officer, State Dept. of Health

Edwin Peterson, M.D., Bureau of Medicine and Surgery, Navy Dept., Washington,

D. C., Assistant, Dept. of Preventive Medicine

Nephi H. Savage, M.D., The Eaton, Apt. 204, Cheyenne, Wyo., Director, Division of Epidemiology, State Dept. of Public Health

Leonid S. Snegireff, M.D., M.P.H., 49 Maple Ave., Trenton, N. J., Medical Supervisor, Preventable Disease Control, State Dept. of Health

Unaffiliated

George A. Bunch, D.D.S., 925 Main St., Columbia, S. C., Director, Division of Oral Hygiene, State Board of Health

Charles Dubois, M.S., City Hall, Albuquerque, N. M., City Sanitary Inspector

Eleanor L. Hearon, M.A., 4200 E. 9th Ave., Denver, Colo., Director, Medical Social Service, Colorado General Hospital

DECEASED MEMBERS

A. H. Flickwir, M.D., Fort Worth, Tex., Elected Member 1921, Elected Fellow 1923.

McLeod Gillies, M.D., Charleston, W. Va., Elected Member 1935.

Charles C. Hopkins, C.E., Rochester, N. Y., Elected Member 1926.

Edward Vincent Murphy, M.D., Newport, R. I., Elected Member 1926.

Joseph C. Palmer, M.D., Syracuse, N. Y., Elected Member 1936.

Walter S. Stevens, M.D., Oklahoma City, Okla., Elected Member 1937.

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge.

Replies to these advertisements, identifying clearly the key number on the envelope, should be addressed to the American Public Health Association, 50 West 50th Street, New York, N. Y.

POSITIONS AVAILABLE

The Civil Service Commission makes announcement of examinations for the following positions:

Senior Medical Officer, \$4,600 a year
 Medical Officer, \$3,800 a year
 Associate Medical Officer, \$3,200 a year

Some of these examinations are for openings in the U. S. Public Health Service in the fields of venereal disease control and industrial hygiene.

Closing dates for receipt of application are as follows:

(a) November 13, 1939, if received from states other than those named in (b) below

(b) November 16, 1939, if received from the following states: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming

(c) March 11, 1940, if received from points in Alaska south of the Arctic Circle.

Necessary application forms may be obtained from the Secretary, Board of U. S. Civil Service Examiners, at any first class post office, or from the U. S. Civil Service Commission, Washington, D. C.

POSITIONS WANTED

Physician, M.D., Vanderbilt University; Dr.P.H., Johns Hopkins; experienced as epidemiologist, health officer and professor of preventive medicine, seeks position as administrator or epidemiologist. A397

Physician, M.D., Johns Hopkins; M.S.P.H., University of Michigan; experienced in school and city health work; for the past year director of county health department, seeks position as health director of city school system or in health service of a college or university. Will also consider position as epidemiologist or health officer in urban health department. A354

Physician, M.D., Syracuse University; postgraduate studies in bacteriology and immunology, will consider position as health officer or epidemiologist. Has served as director of county health unit, director of industrial hygiene and medical statistics and venereal disease field survey officer. A305

Physician, 32, married, M.D. 1936; postgraduate course in v.d. control, experienced as district health officer and in organizing and publicizing syphilis con-

trol campaign; now employed in charge venereal disease clinics in metropolitan health department; seeks v.d. control post with emphasis on organizational, investigative-survey or administration. M437

Young man, bacteriologist, M.S., Cornell; Ph.D., Rutgers; experienced in bacteriology, water supply, sewage, dairy and general public health laboratory work, extensive research in bacteriology and sanitary chemistry, high federal and state civil service ranking as bacteriologist, now employed as bacteriologist in eastern hospital; seeks responsible position in laboratory work or teaching of bacteriology, dairy industry or sanitary chemistry. L439

Experienced teacher in biochemistry and bacteriology; Ph.D., Iowa; now laboratory director in midwestern state; will consider teaching, executive or administrative position. L440

Physician, M.D., Loyola; 4 years' practice of industrial hygiene and surgery; former deputy state health officer; experienced in hospital administration, seeks position. M441

Positions Open

LABORATORY TECHNICIAN—County bacteriological laboratory; should be primarily trained as biochemist but familiar with routine clinical laboratory examinations; \$1,500-\$1,800, increasing; East. 110-PH, Medical Bureau, Palmolive Building, Chicago.

STUDENT HEALTH PHYSICIAN—Young man or woman physician, excellently trained internal medicine, for student health staff, exclusive junior college for women; appointment for one year, subject to renewal. 111-PH, Medical Bureau, Palmolive Building, Chicago.

COUNTY HEALTH OFFICER—Southern rural district; native southerner, or physician thoroughly familiar with the problems of the South preferred. 112-PH, Medical Bureau, Palmolive Building, Chicago.

RESIDENT SCHOOL PHYSICIAN—Recent graduate eligible; unmarried physician, American-born and trained required; school for boys; \$100, maintenance. 113-PH, Medical Bureau, Palmolive Building, Chicago.

CLINIC SUPERVISOR—Graduate nurse qualified to teach principles of public health nursing service to students in patients' homes; outpatient

department, large Texas hospital; \$125. 114-PH, Medical Bureau, Palmolive Building, Chicago.

STUDENT HEALTH NURSE—Graduate nurse, under 34, with 2 years' college training required; duties largely general duty in infirmary of large school for girls; \$100, meals. 115-PH, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—Graduate nurse with postgraduate training public health for school health service; coeducational college, Michigan. 116-PH, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH SUPERVISOR—Department of Health, midwestern state; considerable public health experience in addition to formal training required; beginning stipend vicinity \$2,100 (including travel allowance); increase within 6 months. 116A-PH, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH SUPERVISOR—Municipal public health nursing association; must be capable directing fairly large staff in heavy bedside nursing program; New England city of 50,000. 117-PH, Medical Bureau, Palmolive Building, Chicago.

Situations Wanted

BACTERIOLOGIST—Master's degree, eastern university; 8 years bacteriologist and instructor bacteriology, large municipal hospital; for further information please write M. Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—Graduate of fairly large training school; B.S. in nursing, University of Washington; certified public health nurse; 8 years, city and county health work; 2 years, director of nurses, child welfare organization; most recent appointment, consultant nurse in midwestern state department of health; for further information, please write M. Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

BACTERIOLOGIST—A.B., eastern school; M.S. and Ph.D. (Pathology and Bacteriology), University of Minnesota; several years' interesting research prior to graduate work; especially interested further research or teaching appointment; for additional information please write M. Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH PHYSICIAN—B.S., M.D., University of Minnesota; fellowship Public Health, Harvard University, with special attention to occupational diseases and industrial hygiene; 3 years, state department of health; for further details, please write M. Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

NEWS FROM THE FIELD

PUBLIC HEALTH DENTISTRY COURSE AT NEW YORK UNIVERSITY

A COURSE in public-health dentistry designed to meet the needs of dentists, dental teachers, dental hygienists, nurses, social workers and others who are interested in the scope and functions of social dentistry is being offered at New York University this fall as part of the program of the Division of General Education, according to Dean Ned H. Dearborn. Conducted by Dr. Alfred John Asgis, of the University's College of Dentistry, the course was to have begun September 26, to continue for 15 weeks.

CHILD STUDY ASSOCIATION INSTITUTE

A TWO-DAY INSTITUTE of the Child Study Association of America will be held at the Hotel Roosevelt, New York, N. Y., November 17 and 18, on "Controversial Areas in Today's Thinking About Children." There will be a preliminary session on November 16, for discussion of some of the problems of leadership, held at the headquarters of the Child Study Association, 221 West 57th Street, New York, N. Y.

Among the subjects scheduled for discussion are: "Habit Training as a Factor in Personality Development," "Psychotherapy in Childhood," "Intelligence Testing Today," "Radio Programs for Children—Recent Trends," and "Education at the Crossroads."

NEW YORK STATE INDUSTRIAL BULLETIN

THE State Department of Labor has resumed publication of its monthly, *The Industrial Bulletin*, with

the September issue. Because of the reduction by the 1939 Legislature of the Department's budget for 1939-1940 it has been necessary for the Department to curtail its expenditures for printing, and the July and August issues of *The Industrial Bulletin* were omitted and the number of pages for each issue for the remainder of the year materially reduced. In so far as has been possible, data from the reports which would have appeared in the July and August issues have been consolidated and are appearing in the September issue.

REVISED CARDIAC CLINIC DIRECTORY

A REVISED, up-to-the-minute directory of the city's affiliated cardiac clinics is just off the press and ready for general distribution, it was announced by the New York Tuberculosis and Health Association. The directory, compiled by the Heart Committee of the Association, covers the entire city, lists all cardiac clinics affiliated with the New York Heart Association, notes the clinic chiefs and social workers connected with each hospital, and quotes the hours the various clinics are at the public's disposal. For the first time, it carries a list of employment services and rehabilitation bureaus available to those suffering from heart disease.

The directory is for the use of social workers, public health nurses and teachers, and copies may be obtained free of charge at the offices of the New York Tuberculosis and Health Association, 386 Fourth Avenue, New York, N. Y.

FALLS IN HOME OUTNUMBER MOTOR ACCIDENTS

FALLS in the home caused the deaths of more persons in Iowa during the first 11 months of 1938 than did motor vehicle accidents, according to the State Department of Health. For this period, 462 deaths from falls were reported, as compared with 416 motor vehicle deaths.

The greatest toll of lives claimed by injuries from falls was in the age group of 65 years and older. In this group, 405 deaths were recorded, while motor vehicle accidents accounted for 106 deaths in this group, and 188 deaths of persons between the ages of 25 and 64.

Between 25 and 64 years, 42 deaths from falls were reported.

There were 10 deaths of children under 5 years of age, 3 in the age group of 5-14 years, and 2 between 15 and 24 years.

Polished floors, icy porches and front steps, loose rugs, and toys on the floor were given as causes of falls. Several children died from injuries sustained when they fell out of high chairs. Falling out of chairs, out of bed, and tripping were among the causes of death of persons in the oldest age group. The most unusual death was that of a woman who walked out of the house in her sleep and fell into a well. She was rescued but died of injuries from the fall.—*J.A.M.A.*, Sept. 30, 1939, p. 1338.

PERSONALS

Central States

DR. HARRY E. KLEPINGER, of Lafayette, Ind., has been appointed Health Commissioner of Tippecanoe County, succeeding the late DR. FRANK M. BIDDLE, of Battle Ground.

DR. WILLIAM M. MOIR, of Indianapolis, Ind., has been appointed Health Officer of Washington County and Bristol, Va., succeeding DR.

EARLE C. GATES, who will attend Johns Hopkins University for the coming year.

DR. AUGUST C. ORR, who has been Director of the Child Hygiene Division of the North Dakota State Department of Health, has been appointed Director of the Sixth District of the Michigan State Department of Health, with headquarters in Newberry.

RAGNAR T. WESTMAN, M.D., DR.P.H.,† of Minneapolis, Minn., has been appointed Director of Health in Kansas City, Kans., succeeding WILLIAM F. LUNSFORD, M.D., M.P.H.,† who died recently.

Eastern States

DR. WALTER G. ALEXANDER, of Orange, N. J., has been appointed a member of the New Jersey State Board of Health, Trenton.

LEONA BAUMGARTNER, M.D., PH.D.,† is leaving her position as Director of Public Health Training in the central office of the Department of Health, New York, N. Y., to become District Health Officer in the Kips Bay Health Center District, New York, N. Y., on November 15. Dr. Baumgartner will also be attached to Dr. Wilson G. Smillie's* Department of Public Health and Preventive Medicine of the Cornell University Medical College, New York, N. Y.

ROBERT P. FISCHELIS, PHAR.D.,† of Trenton, N. J., Executive Secretary and Chief Chemist of the Board of Pharmacy of the State of New Jersey, has been appointed a member of the New Jersey State Board of Health. The appointment comes at a time when a new State Food, Drug, and Cosmetic Act goes into effect in New Jersey, and the legislature has amended the State Health Act to add a pharmacist to the Board. Dr. Fischelis is the first pharmacist to hold this appointment, which is for

a 4 year term under the amended Act.

DR. ABRAHAM FLEXNER has resigned as Director of the Institute for Advanced Study, at Princeton, N. J., due to ill health. He will be succeeded by DR. FRANK AYDELOTTE, President of Swarthmore College, Swarthmore, Pa.

FREDERICK P. LEE, M.D.,* of Paterson, has been appointed a member of the State Board of Health, Trenton, N. J.

MORTON L. LEVIN, M.D., DR.P.H.,† of New York, N. Y., has been appointed Assistant Director on the Cancer Advisory Committee for the new New York State Division of Cancer Control, Albany, N. Y.

DR. CHARLES F. McCARTY, of Brooklyn, N. Y., recently Medical Director of the City Department of Welfare, has been appointed Associate Director of Medical Activities of the Medical Society of the County of Kings.

GEORGE ALBERT SOPER, PH.D.,* of Brookhaven, N. Y., Consulting Engineer, has been appointed a Consultant in the U. S. Housing Authority. He will actively supervise that phase of USHA housing management concerned with collection and disposal of waste in the public housing projects; and will serve as consultant in public sanitation to local housing authorities in establishing methods of ground maintenance as a joint enterprise of managers of public housing projects and tenants.

Southern States

DR. ALBERT L. BALL, of Gallatin, Tenn., has been appointed Health Officer of Bradley County, to succeed WILLIAM V. SANFORD, M.D.,† of Cleveland, resigned.

DR. JAMES C. BRABHAM,† of Johnsonville, S. C., has been appointed Health Officer of Lexington County.

This county was formerly joined with Calhoun County in a health unit under the direction of FRANKLIN L. GEIGER, M.D.,† of St. Matthews, who remains in Calhoun County.

GEORGE F. BROCKMAN, M.D.,† of Louisville, Ky., has been appointed Health Officer of Muhlenberg County, to succeed DR. NEALE M. ATKINS.

DR. PHILIP R. CRONLUND, of Washington, D. C., has been named Health Officer of Lee County, to succeed DR. JAMES M. SUTER, of Jonesville, who will attend Johns Hopkins University for the coming year.

DR. WILLIAM A. DODSON, JR., of Fayette, Ala., has been named Health Officer of Winston County, succeeding DR. PAUL H. HILBERT, of Double Springs, resigned.

DR. THOMAS S. ENGLAR, of Baltimore, Md., has been appointed Health Officer of Albemarle County and Charlottesville, Va., succeeding ROBERT D. HOLLOWELL, M.D.,† who has gone to Shelby County, Tenn.

DR. CLAIR A. HENDERSON, of Dawson, Ga., has resigned as Health Officer of Terrell County, to become Assistant Health Commissioner of Savannah.

DR. JAMES ROBERT HENDON has been named to succeed GRADIE R. ROWN-TREE, M.D., C.P.H.,† as Director of Activities in Venereal Disease Control of Louisville, Ky. Dr. Hendon has been Acting Director of this Division.

DR. PAUL H. HILBERT, of Double Springs, Ala., has resigned as Health Officer of Winston County, to join the Health Department in Cincinnati, Ohio.

ROBERT D. HOLLOWELL, M.D.,† Health Officer of Charlottesville and Albemarle County, Va., has been appointed Health Officer of Shelby County, Tenn.

ARCHIE B. HOOTON, M.D.,† of Upper Marlboro, Md., has been made

Health Officer of Allendale and Hampton Counties, S. C., taking over part of the work of Dr. LOUIS T. CLAYTOR, who has been in charge of these counties as well as Barnwell and Bamberg Counties. Dr. Claytor will remain as Health Officer of the latter two counties.

DR. JAMES A. LOVELESS, recently of Chattanooga, has been appointed District Health Officer of Rhea-Meigs County, Tenn., succeeding EDWIN N. HALLER, M.D.,† of Decatur.

DR. GEORGE E. MADDISON, of Monroeville, Ala., formerly Health Officer of Monroe County, has been appointed Health Officer of Henry County, succeeding Dr. CARL T. MARTIN, of Abbeville, who resigned to enter private practice.

DR. MARVIN E. McRAE, of Richmond, Va., has been appointed Health Officer of Pittsylvania County, Va., succeeding Dr. EUGENE B. SHEPHERD, of Chatham, resigned.

GRADIE R. ROWNTREE, M.D., C.P.H.,† who has served as Acting Director of Health of Louisville, Ky., in the absence of HUGH R. LEAVELL, M.D.,† during the past year, has now been appointed Assistant to Dr. Leavell.

DR. PRICE SEWELL, JR., formerly of Jackson, has been appointed Director of a new health unit in Owen County, Ky.

Western States

DR. FLOYD W. BAUGH, of Burlington, Wash., has been appointed Health Officer of Skagit County.

DR. LEROY L. FATHERREE has been ap-

pointed full-time Health Officer of Little Rock, Ark., to succeed the late THOMAS M. FLY, M.D.†

DR. JOHN T. HERRON, of Little Rock, Ark., has been assigned as Health Director of the district composed of Ashley, Desha, and Chicot Counties.

THOMAS D. MENSER, M.D.,† of La Junta, Colo., acting head of the Otero County Health Department, has been appointed Director of the new city-county public health unit in El Paso County, with headquarters in Colorado Springs, Colo.

DR. WILLIAM E. STEELE, of Longview, Wash., has been appointed Chief Medical Adviser to the Washington State Department of Labor and Industries, a position he held several years ago.

DEATHS

A. W. FLICKWIR, M.D.,* Health Officer of Fort Worth, Tex., died July 26, 1939. Dr. Flickwir, who became a member in 1921 and a Fellow in 1923, was a member of the Health Officers Section Council and a member of the Governing Council of the American Public Health Association at the time of his death.

HARVEY CUSHING, M.D., distinguished brain surgeon and educator, died in New Haven, Conn., October 7, at the age of 70.

JOHN W. McINTOSH, D.P.H., M.B.,† Senior Medical Health Officer of Vancouver, B. C., Canada, died recently.

CONFERENCES AND DATES

American Academy of Pediatrics. Cincinnati, Ohio. November 16-18.

American Association for the Advancement of Science. Annual Meeting—Columbus, Ohio, December 27, 1939-January 2, 1940.

American Education Week — 1939. Theme, "Education for the American Way of Life." November 6-11.

American Public Welfare Association. Round Table and Annual Meeting. Washington, D. C. December 6-10.

American Journal of Public Health and THE NATION'S HEALTH

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Health for Three-Thirds of the Nation*

EDWARD S. GODFREY, JR., M.D., F.A.P.H.A.

*President, American Public Health Association; State Commissioner
of Health, Albany, N. Y.*

THE choice of my subject this evening has been motivated primarily by the stress given at the National Health Conference of 1938 to the plight of that one-third of our nation which is attempting to exist on an average family income too small to provide the food, clothing, shelter, and medical care needed for the maintenance of health. It is motivated further by the tendency of later public discussion of medical care to center about this lowest economic group and the marginal group just above. It is motivated by this tendency to confuse the health service which was designed to serve the public as a whole, with other services designed to benefit only certain economic and occupational groups; by the tendency to confuse public health medicine with relief medicine, including under this term the various types of sickness insurance that have been proposed.

It is, of course, one of the teachings of public health administration that the

health department should apply its efforts where the need is greatest and most immediate and where the returns are greatest in life saving and sickness saving. It does not follow, however, that legislation for health should be addressed to segments of the population, classified according to income or occupation. Certainly, there is a grave danger to both the quality and the quantity of the services for the health of the entire people, when public health work is associated administratively with agencies dealing exclusively with low income groups of the population. Public health is something which should grow. Agencies for relief are something that should disappear.

The effects of immediate medical relief are tangible; of prevention, intangible. The former has a strong emotional appeal. The latter is rarely well appreciated, even by those whom it benefits most. The former commonly has first call on the taxpayer and the contributor to philanthropy. Its demands for medical care run into hundreds of millions of dollars annually. The public costs and the private costs of

* Presidential Address presented before the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939.

medical relief are many, many times greater than the funds spent by taxpayers and philanthropy for preventive health services.

The public has become used to spending—not only in recent years—on this scale for medical relief. Hence it is that in any competition for appropriations, prevention nearly always gives way to relief. The comparatively little more money needed to convert relief medicine into public health medicine is not obtained unless there is continuous and insistent pressure for it.

Medical relief, with rare exceptions, looks not to what lay back of the immediate difficulty, nor to what lies ahead for the individual or the family concerned, but deals solely with the immediate problem of the care of a sick or injured individual. This is as true of private practice as of public or quasi-public practice. Concentration of attention on the cost of medical care and relief from its burden is likely—to use a phrase of President Roosevelt's—merely to stimulate further “bailing of the boat, rather than calking of the seams.”

The only safeguard that would seem to insure continuance of a dynamic public health movement, and to insure that any governmental expansion of medical services has the improvement of public health as its primary objective, is to place the administration of any such expansion squarely upon the shoulders of departments of health—national, state, city, and county. When this is done, these health departments must of course, be given the necessary increase in moral and material support that will enable them to deliver public health medicine and not merely relief medicine. Given this, they should be held responsible for results and must not evade that responsibility.

Health authorities should have increasing opportunity as soon as possible to acquire experience in the delivery of

medical care. When given the opportunity, it should be developed along public health lines, bringing all the necessary available forces of the health department into play. By this I mean, not only giving the best possible in diagnosis and treatment, but also in looking for the causes of disease or accident and in correcting them if possible; in looking for further opportunities for preventive services in the home and among the family. It is this kind of medicine that I mean when I speak of public health medicine.

Let it be recognized clearly, however, that there remain many immediate services in the field of prevention that should be supplied. There are many imperfections of organization in the national, state, and local health services for their present duties and functions that can and should be corrected. Perhaps we might better examine some of these before calling attention to the imperfections elsewhere.

In the national government, the division and dispersion of health functions among the Public Health Service, the Children's Bureau, the Bureau of the Census, and the Food and Drug Administration are so well known to state health administrators that I shall not comment. They are all agencies with which state health departments have to deal. The recent transfer of the Public Health Service to the Social Security Administration did nothing to simplify this confusion nor to coordinate these functions.

The proposals of the Wagner bill (S. 1620) did nothing to correct them. In fact, its proposal to place the administration of any federal aid for medical care, and hospital and health center construction under the Social Security Board only added to the complexities. The proposal to have the Department of Labor administer federal aid for industrial hygiene, if adopted, would cap a climax of chaos. It remains to be

seen whether groups with special interest in one or another special phase of public health are sufficiently broad in their concepts and clear in their desire for health for everyone to aid in producing an inclusive national health program under a single authority at the national level.

At the state level, we find such a variety of divided authorities dealing with health matters that it is difficult to devise a classification. In one state, the health department is not even responsible for the collection of vital statistics. In certain states, there are separate agencies for crippled children. Food, drug, and cosmetic control finds a place in fewer than half the state health departments; school medical inspection is supervised by the state education department in a number of states; industrial hygiene is a function of labor departments in 2 of the 25 states that make any provision for this important work. With few exceptions, even the services provided by states for the control of tuberculosis are not concentrated in the state health department, and too often any state program adjusted to the importance of this disease is altogether lacking.

To bring these deficiencies of health organization, public and private, down to the local level would merely add to the picture of confusion and emphasize further the deficiencies of functional services. Some voluntary organizations, for instance, interested in particular phases of public health, are performing duties properly belonging to the local health department. Too often they continue to perform these functions while doing little or nothing to build the health department up to a point where it is capable of administering the function effectively. The fault, no doubt, lies as often with the health department as with the agency.

Let me make it clear that this criticism does not refer to the philan-

thropic organization that provides for a demonstration that operates through a government agency, which serves notice that it will get out at a certain time and, when that time arrives, gets out. Such agencies are looking to the up-building of useful governmental functions, *by government*. They are not designed as mere palliatives for social ulcers, which an immature political government may be incapable of recognizing or treating, until it has been shown how to do it.

Nor does it refer to those agencies which aid and promote the proper development of public health authorities by building up public opinion for their support and organizing the interest of citizens for effective action through education. As permanent auxiliaries, they are probably of even greater importance than the "demonstrating" agency.

Perhaps it will be thought that I unduly emphasize the importance of proper organization. I think not. Sound organization means economy and efficiency. Lack of it means waste and inefficiency—waste and inefficiency, not only in expenditure, but in the competition to obtain funds. It means waste and inefficiency in overhead, in duplicating and overlapping services, waste in the effort to fill the gaps between doubtful borders.

The deficiencies of existing public health services are not things we health officers want to hide from the public. We want the public to know them and to correct them. We need better, more specially educated personnel, more facilities and better organization. Though the triumphs of public health have been many, reiteration of them is likely to lead to the impression that the job has been done. There are those who believe that public health work should be limited to sanitation of the environment, and to the control of communicable diseases through immunization of the susceptibles and restriction

of the infected. They profess to see a sharp distinction between curative and preventive medicine, between functions which may properly be operated by health departments and those which belong either to another department of government or are the exclusive reserve of private medical practice and medical philanthropy. Events tend constantly to disprove the accuracy of their vision. Experimental effort disproves the accuracy of their prophesies.

It has always been thus. Not one single advance in public health has failed to encounter opposition. The reporting of communicable diseases, from typhoid fever through tuberculosis, to syphilis and gonorrhea, was opposed by many doctors; the purification of public water supplies, by taxpayers and private water companies; the installation of sewers and sewage treatment works, by taxpayers and industries of the offending communities; milk control by milk producers and dealers, as well as a deluded minority of their customers; free laboratory service, by established private laboratories; school medical examinations, by school trustees, physicians, parents, and school superintendents; the establishment of well-baby, orthopedic, tuberculosis, venereal disease, and children's clinics, the employment of public health nurses, and the establishment of county health departments, by interested minorities of the medical profession. All have had to meet and overcome, not merely inertia, but active opposition.

Of course, always there has been support for these measures by progressive, socially minded doctors. Not many advances would have been possible without them. Often they have assumed *leadership* in the struggle. This is not a grudging admission. It is a declaration by one who has good cause to know what this kind of medical man has contributed to every

advance. It is the intransigent conservative who usually obstructs. Always these opposition groups are abetted by a group of short-sighted taxpayers unwilling to spend an immediate dime to save an ultimate dollar.

We who are in public health do not believe we have been led to a consideration of the spread and the quality of medical care by any desire to increase our prestige, our influence, or importance. Consideration of this problem has been forced upon us by the evidences of neglect, of non-treatment, mistreatment and maltreatment, that have been thrust upon us in the course of our daily work. As medical men and women, as nurses, medical social workers, we see daily the results of poverty, ignorance, fear, pride, and what seem to be the shortcomings in our existing system, or lack of system, of medical care. We see the cases of tuberculosis that have reached an advanced stage before recognition or at least before receiving efficient care; cancers that have metastasized before receiving a competent medical examination.

We see the results of that pride which has prevented self-respecting individuals from asking for medical care which they cannot pay for, until dire necessity forces them to ask. We have seen cases of recognized tuberculosis refuse sanatorium treatment because their inherent dignity refused to submit to the dime searching investigation demanded by short sighted officials who wrongly think that the voting public demands this parsimony even in matters of life and death.

It is difficult to reconcile the opposition of so many physicians to free syphilis clinics with the spirit of the Hippocratic oath and the first section of the Code of Medical Ethics, which declares in essence that the care of the patient is the primary consideration; that the compensation of the physician

is subordinate. Why must an unfortunate's scanty resources be exhausted on a few inadequate weeks of private treatment, before he becomes eligible for a free clinic, if such exists; why is the treatment of so many patients terminated when their funds are gone, without even a suggestion that they go to a clinic.

Why does a profession, which presumably has made some study of human psychology, fail so largely to appreciate the real mental distress of most persons in admitting economic defeat, which is implied in asking for free medical care under our present system; and why, if it be recognized, is a profession which is essentially humanitarian, so inconsiderate? Why is there such insistence on the "fee-for-service" method of payment? A rational explanation of the opposition to free medical care by the government is in part due to the quality of the physicians and the services that have so often been rendered in the past under the "poor doctor" contract system. In greater part, however, it lies in the exploitation by both government and philanthropy of (1) the desire of the true physician to improve his knowledge by wider experience even at great self-sacrifice; (2) his ambition to achieve a justified prestige among, not only the public, but his fellows of the profession; (3) the profession's effort to adhere to a custom, consonant perhaps with the days when medicine was more largely pastoral, but which is utterly inconsistent with the scientific and technical advances of the past quarter century.

The "personal relationship" argument has been overplayed. The kindly physician "with a heart of gold" who "grannied" the children but practised the medicine of his student days, is no substitute for the doctor who uses the knowledge and instruments of modern science. I want no "pastoral" medicine in mine, until the scientific resources

of diagnosis and treatment have been exhausted.

We public health people see many instances where the fee-for-service system of payment has interfered with the rendering of a complete health service. The interference is not merely the payment for the primary call, but the inhibition imposed on the physician against offering or suggesting services for other obvious needs of the individual or his family. Such an offer with a fee in sight, may be interpreted as seeking business; an offer without expectation of fee, as chiseling, cutting prices, and unfair competition. It is doubtful that any amount of public health education can overcome the economic and psychological barriers imposed by this "fee-for-service" system, and its alternative of "pauper" care. There must be something better.

For my own part I want to reiterate my resentment of the imputation, implied or explicit, that a salary stultifies, that a fee must be received or expected for every service rendered or it will be rendered grudgingly, inefficiently, or both; that men and women in public service are any less worthy in education, in capacity, in interest, in devotion to duty, than those who are in what we call "private life." I resent the imputation that no medical health officer ever worked overtime, exercised any independent judgment, or is anything more than a robot motivated by a monthly salary check.

In a recent address a prominent exponent of "organized" medicine asked the rhetorical questions whether we wanted England's, Hitler's, Stalin's, or New Zealand's medicine, or American medicine; whether we wanted socialized, state, or democratic medicine. Since the questions were obviously rhetorical, the expected answer was equally obvious that we wanted American, democratic medicine. Just what American, democratic medicine would be was not

explained. It may be well to raise that question. Possibly it might mean democratically administered state or socialized medicine, and it might include elements contained in or drawn from the systems of the various countries mentioned, or others.

In spite of the propagandist questions and implied answers of opponents of change typified above, we may well ask ourselves seriously what is American democratic medicine, and how may it or should it develop to be something truly American, truly democratic, and truly medicine in the best sense of the word. My answer is that it must be public health medicine, which means that it is preventive as well as curative medicine; that it is medicine delivered without distinction as to race, creed, occupation, or income; that it is for no less than three-thirds of the people.

It is typical of American government that it proceeds through legislation in response to a public demand. When mistakes are made in legislation they are rectified when they become apparent to a sufficient body of the voting public. This applies whether the error be inherent in the legislation or whether it fail to provide sufficient safeguards against administrative abuse or inadequate fiscal support. Important legislation involving large social or economic change is always accompanied by public hearings where expert testimony and the views of those interested in the probable effects of such legislation, whether they be thought good or bad, may be heard. If the subject be controversial there is further debate by the legislative body itself before a final vote is taken. All this is part of what we call "the democratic process."

Anything, therefore, which becomes law after being duly considered and enacted in this fashion by an American legislative body, provided it is constitutional and legal, is American and is democratic. "Name calling" cannot

make it otherwise. It seems necessary to labor this point because so many seem to have such strange and erroneous impressions as to what is democratic and what is American. They do not think of, or do not know, of the many things in our government, our laws, jurisprudence, customs, and culture which derive from foreign sources. Until a generation ago the education of the American physician was hardly considered really complete until he had studied in Europe. The things we have brought from abroad we have adapted to our ways and we usually improved them. There is no reason why we should not in our own way, adapt, develop, and improve any form for the social reorganization of medicine that may be suggested by the results of the experience of other countries.

One thing we appear to need badly is American experience acquired through experiments, experiments that bring the health departments definitely into the picture. I doubt the health department need be concerned with experiments in medical indemnity insurance, since the common requirement that the first calls be made at the patient's own expense—*i.e.*, are not indemnifiable—tends to defeat the public health objective of prompt early diagnosis and care. It seems doubtful that such plans will ever reach the border-line income group on a *voluntary* basis, or will ever obtain popular confidence and support for a *compulsory* basis.

It seems entirely proper, however, for health departments to take a greater interest in the work of hospitals and groups giving medical care on a prepayment basis. Coöperation with the latter, should be predicated on the physicians employed being qualified for the services they are to render and ethical in the true and best sense of that term. I would say they should conform to the principles of ethics of the American Medical Association if

the fourth and fifth features, which make contract practice unethical, were more reasonably interpreted than they have been at times in the recent past. These are the features relating to reasonable competition in the community and "free choice of physician." That the patient's choice may not be a good choice has been abundantly demonstrated not only by the pecuniary success of blatant quacks, but by the experience of many communities paying for welfare cases on the fee-for-service basis. How could it possibly be otherwise when the patient has so little information on which to make a choice and receives so little help in making it.

"Reasonable" competition is a matter of opinion. It would seem that if this question is applied to the competition provided by a group of physicians organized under a prepayment plan, that decision should rest on the adequacy of compensation paid to the physicians in the group and of the facilities provided for their use. The quality of the service rendered would appear to be a proper basis for the group's competition with the profession as a whole, just as it is supposed to be between those in private practice.

There is greater need that state health departments interest themselves more keenly in the medical services rendered in connection with recognized fields of public health. The more extensive operation of government owned and operated tuberculosis hospitals under health departments would help bring all the forces of both groups into closer relationships and be mutually stimulating. The clinics for venereal diseases operated by local governments or with government aid have improved so materially in recent years that there is every encouragement for further expansion until the current needs are met competently and decently.

The improvement has been not only in the quality of treatment given but

in better surroundings, more sessions and personnel, thereby permitting more time per patient. Both patients and doctors are better satisfied; there are fewer delinquencies; less effort is needed for the follow-up. Under the direction of the health department, generalized public health nurses are available for the necessary field services, are in closer touch with the clinic's problems, and come to a better appreciation of the venereal diseases as a public health problem. This is a development along the line of what I have termed public health medicine.

The services rendered in many health department clinics compare favorably with those operated by voluntary hospitals. As compared with general practitioner service, it is highly probable that better histories are taken, more sources of infection and contacts are examined and treated, more general physical examinations made, and better and more continuous treatment given.

Time will not permit of anything more than mention of how free public laboratory service has increased the use of laboratory aids to diagnosis; how well-baby and children's clinics have improved the examination of such children when brought to private practitioners; how prenatal clinics have increased the use of pelvimetry and taking of blood pressure; likewise, how orthopedic clinics have led to earlier recognition of and consultations for crippled children.

But in every advance that has been made in these services that lie outside the traditional field of environment and contagious disease, health departments have had to step with extreme care lest they violate or seem to violate or be charged with violating some assumed privilege or prerogative of the medical profession. While many conscientious physicians oppose the so-called "encroachments" of public health into clinical medicine, many of them are not

aware of the existing shortcomings of private practice in protecting the public interest, and some of them refuse to recognize the validity of any evidence that runs contrary to their opinions.

The present opposition of so-called "organized medicine," or of its spokesmen, to the expansion of public health service rests on grounds that are hardly tenable. These grounds of opposition are stated in a sort of *obiter dictum* purporting to explain the second principle of Chapter IV of the Code of Medical Ethics. This chapter relates to the Duties of the Physician to the Public, and the principle covers the subject of Public Health. I quote:

The profession has resisted the efforts of some public health officials and employees to extend their work into the direct practice of medicine among individuals. Opposition to such practice is based on the already often repeated principle that medical relations are among the most personal and confidential of all human relations. They cannot be created in any satisfactory form between an official department or institution and an individual.¹

These views rest fundamentally upon an inadequate concept of what the field of public health does and should comprise. The reasons given for opposing expansion are inadequate. The evidence obtained from experience demonstrates that satisfactory personal relationships have been maintained between physician and patient in many government medical services. The objections cited will not suffice to dam the current of public opinion which is becoming impatient with delay, and demands expansion to meet the obvious needs.

It is an American custom to leave matters to private initiative and performance until the public becomes convinced that a public agency can do it better or more adequately. Our fire departments evolved from the volunteer companies whose actions today evoke amusement. There are still volunteer fire companies, and fire insurance com-

panies have developed their "protectives." The major functions of our police departments were formerly performed by private police or agencies selling their services to the private buyer. There still are private detective agencies.

Our vast system of public education has developed from the church, private and "pauper" schools established in Colonial days. In the second quarter of the last century—one hundred years ago—the struggle to secure free public education was second only to the question of slavery in the controversies of the northern states. Free public schools have won everywhere. But there are still private schools for those who wish to use them. The objective was not to abolish non-public schools, but to make certain that for every child there was an available school which he could attend without injury to his sensibilities. The arguments used in the controversy over the free school system are almost counterparts of those used today in the discussion of the expansion of government participation in medical care. It was argued that free public schools would halt improvement—ruin the existing private schools—and, above all, pauperize the people. Though some private schools went out of existence, many became part of the public school system. The system did not halt progress and it did not pauperize the people.

CONCLUSION

I fear that I have offered little in the way of constructive criticism, except possibly by way of implication and suggestion. If so, it is because I do not know all the answers. I have read, I have sought advice, I have searched my own experience. Some things seem clear, others hazy.

Although the *Minority Report* of the Committee on the Cost of Medical Care and the attitude of the official *Journal*

of the American Medical Association make it seem improbable, something might be gained by a conference which would review the findings of that committee, the national health survey, and the survey conducted under the American Medical Association and its subsidiaries. It is doubtful, however, in view of the incomplete and distorted information the *Journal* has published, and the reliance so many of the medical profession have placed on it as a source of information on both the technical and sociological aspects of medicine, that any important change of attitude can be expected from such a conference. Nevertheless, I offer the suggestion in the hope that there may be constructive guidance in an American, democratic spirit in the effort to legislate for a national health program. Persecution and prosecution will not answer our purpose.

Most of us medical men who practise the specialty of public health have been in private practice. We know the ways of practice as it is actually practised. We know its trials and diffi-

culties. We recognize its accomplishments. We want no cheap medical care. We are for adequate compensation for qualified practitioners, not mere "soup-bone security" nor a mere "living" wage, but a compensation compatible with the education and culture required of a doctor, and bearing a direct relationship to the responsibilities that are involved in his daily work. We believe in compensation for doctors working in hospitals, clinics, and dispensaries, and for those giving free services in their offices and in patients' homes. We are for, not only high standards of medical education, but high standards of medical care and advancement of those standards in accordance with the discoveries of medical science. We are for a system of medical practice and a system of public health administration and public medical service that will achieve our hope and our goal of the best possible health for three-thirds of our people.

REFERENCE

1. *Economics and the Ethics of Medicine*, Bureau of Economics, A.M.A., 1937, p. 52.

Public Health Aspects of the Federal Food, Drug, and Cosmetic Act*

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IF we were to adhere strictly to the title of this paper it might be concluded after a careful scrutiny of the Federal Food, Drug, and Cosmetic Act that its provision are few so far as public health—in terms of preventive medicine—is concerned. While the Act does not parallel that type of legislation common in state laws and in municipal ordinances which demands that market milk and cream shall be pasteurized and produced only by tested herds found to be free from disease, it does, however, embrace provisions which affect the public health and which are bound to afford our citizens an increased measure of protection. In a paper presented to this Association 12 years ago, the present speaker discussed the public health feature of the Act of 1906. Briefly, the conclusions, after 20 years' enforcement of that statute, were to the effect that essentially the only public health features were those which forbade the introduction of poisonous or toxic substances in foods in such amount as would render the food injurious to health, and the general provisions against the interstate shipment of food contaminated with filth, as well as food which was the product of a diseased animal. The drug sections of

that Act related essentially to misbranding and were practically ineffective so far as public health protection is concerned. The Act of 1938 has made a definite step forward in the field of foods, drugs, and cosmetics which promises a definite measure of protection from the standpoint of public health.

Taking up first of all the food section of the Act (402(a)(1)), we find that a food is now adulterated if it bears or contains any poisonous or deleterious substance which may render it injurious to health. Under the Act of 1906, this was not true, for, to cite one instance, under that Act the interstate shipment of mussels, fatal to humans at certain times of the year, if not misbranded could not be prohibited. Our only action under that law was in the case of foods to which man had added a poisonous or deleterious ingredient. Furthermore, a section of the present Act reiterates this prohibition of naturally dangerous food, and in addition directs the establishment of a safety limit or tolerance in the case of foods which cannot be produced or manufactured without the addition of some toxic material. An example here, of course, is illustrated by those fruits and vegetables which, to insure a crop at all, must be sprayed with some material such as arsenate of lead. Perhaps a more striking feature

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with respect to protection is that section of the new law which authorizes the Secretary of Agriculture to establish a system of control by the issuance of permits. The condition under which this licensing system may be established is represented by a food establishment where there is the possibility of contamination with microorganisms and the safety of the food emanating from such establishment cannot be adequately determined by objective examination. In other words, if a food establishment is so conducted that there is the possibility of contamination of the product with microorganisms and the resultant product likely to cause sickness before examinations can be completed, then, and then only, is the Secretary of Agriculture authorized to forbid such shipment from such establishment until the issuance of an official permit. Less drastic perhaps is the clause which declares food to be adulterated if it is produced, manufactured, or handled in an establishment in a manner whereby it may become contaminated by filth. Still another new provision rules out containers for food which by their composition may contaminate the contents. The misbranding section which applies to food requires among other things that in the case of a food composed of two or more ingredients and for which no standard of identity has been established the label shall disclose the common or usual name of each ingredient, except a collective declaration for spice, flavoring, and color. This provision of the law rigidly enforced should afford a valuable guide to those unfortunate consumers who are allergic to specific items in the dietary.

Since nowadays the public is educated along scientific lines by feature articles in the press as well as by radio, the term "vitamin" has become a household word and claims for special diets are widely heralded—so much so

that Congress has ruled that foods for special dietary purposes or those bearing vitamin claims shall be adequately labeled to inform the purchaser as to their value for the uses claimed, and the Secretary is authorized to prescribe regulations to this effect.

Incidentally, only harmless and certified coal-tar colors may be used, where their use is not otherwise illegal, in foods, and a system of certification for all such dyes has been established. Already lists of dyes suitable for use in foods as well as dyes suitable for drugs and cosmetics have been published. Artificial colors, artificial flavors, and permitted chemical preservatives are required to be so declared on the label.

When we come to the section of the Act which relates to drugs and therapeutic devices, we find here the one outstanding provision so far as public health and protection are concerned. I refer to Section 505, known as the New Drug Section. The Senate of the 75th Congress passed a resolution, No. 194, requesting information as to the cause of deaths attributed to the so-called Elixir of Sulfanilamide, and the report of the Secretary of Agriculture is incorporated in what is known as Senate Report No. 124. At the time this report was made, in November, 1937, 93 deaths traceable to the so-called Elixir of Sulfanilamide were reported by the Secretary of Agriculture, and, as history shows, this number was finally increased. Sulfanilamide itself had been acclaimed by members of the medical profession as a marvelous therapeutic agent in many severe manifestations of an infectious order. Much has been written of the therapy of this drug, as the pages of the *Journal of the American Medical Association* attest, coupled, however, with the editorial comment that caution should be exercised in its administration and that such administration should take place

only through competent physicians.

A firm of manufacturing chemists, having a request for this relatively insoluble drug in a liquid form discovered through their chemist that diethylene glycol was a solvent. The firm thereupon manufactured quantities of this so-called Elixir, really a solution, in diethylene glycol, of sulfanilamide, and put it on the market largely through physicians, although drug stores supplied consumers by over-the-counter sales with it. Early in October, 1937, the Food and Drug Administration received reports of deaths attributed to the administration of this drug in liquid form. Immediately investigators were dispatched to the scene of death, as well as direct to the manufacturing firm, and our inspectors found that this firm had actually put this drug on the market without experiments to determine its safety, in spite of the fact that prior to that time medical literature had emphasized the possibility of toxic symptoms of this glycol. The firm simply tested the product for flavor! While there were some sales of this drug over the counter to purchasers, most of them were through physicians direct, or on prescriptions.

Obviously, this statement should not be interpreted in any sense as a criticism of the medical profession on the ground of carelessness, since the practising physician, with the multitude of drugs which are placed on the market at his disposal, is wholly incapable of determining for himself the safety of products put out by firms which enjoy a reputation for dependability. Rather is the criticism to be placed upon failure of the public to protect itself through adequate legislation. Fortunately, this defect has been remedied, so far as is practicable, for when the Federal Food, Drug, and Cosmetic Act was passed in June, 1938, it not only contained a specific section relating to new drugs but designated this as

emergency legislation, effective at the time the signature was placed on the bill; this date was June 25, 1938.

To show how Congress has safeguarded the manufacture and shipment of new drugs, the law requires that in the case of a new drug, first an application must be filed with the Secretary of Agriculture, and it must contain full reports of all of the investigations which have been conducted to show the safety of such drug, there must be included a list of all of the components, the actual composition of the drug and the control exercised in the manufacturing, processing, and packing, and in addition samples of the drug and the complete labeling must be submitted. After sixty days an application is effective unless notice to the contrary issues. If the information is deemed insufficient and tests inadequate, the Secretary shall refuse the permit, or he may even revoke it after the permit becomes effective if subsequent tests show that the original tests were inadequate, or if the application contained false statements.

New drugs used solely for investigational purposes by experts who by training and experience are so qualified are exempted. By regulation, a drug is deemed to be new if any element of its composition is new, whether menstruum, excipient, carrier, coating, or other component, or a combination of two or more substances none of which is a new drug, or variation in the proportion of a substance even though that substance is not a new drug. Where the use of a drug, not in itself a new drug, for treating other symptoms than those for which the drug has been used is deemed a new drug, also a drug is "new" if the dosage, or method or duration of administration or application or other condition of use suggested in the labeling is changed, even though such drug is otherwise not a new drug. To show the significance of this sec-

tion, the Food and Drug Administration has to date on file more than 1,700 applications for new drugs.

Another important section of this new law is the one which relates to dangerous drugs, and which declares that a drug is deemed misbranded if it is dangerous to health when used in the dosage, or with the frequency or duration prescribed, recommended, or suggested, in the labeling. While the Act does not specify drugs which are dangerous, under this section the Food and Drug Administration, after the passage of the Act of 1938, issued specific notices to the effect that the department would regard cinchophen, neocinchophen, aminopyrine, sulfanilamide, and related substances, as coming within the ban of this section. These drugs have been designated as dangerous within the meaning of the Act because of the reports in the medical literature as to the untoward effect of their administration. There are others for which no similar notice has been or will issue. The responsibility in each case must rest upon the manufacturer.

Aminopyrine, as the medical profession knows, is capable of producing fatal agranulocytosis and this has been known for a number of years. Cinchophen and its derivative, neocinchophen, are definitely associated with acute atrophy of the liver. Sulfanilamide, with its known possible damaging effect on the blood cells, is definitely placed in the dangerous class. In fact, the Council on Pharmacy and Chemistry of the American Medical Association has warned against the indiscriminate use of this drug.

Another drug, which was the subject of publicity under the Act of 1906, is dinitrophenol, the reducing agent so often attended with tragic results. We have available reports of practically 100 cataracts as a result of the use of this drug. This also appears responsible for cases of agranulocytosis. As long ago

as 1933, the Council on Pharmacy and Chemistry, in the *Journal of the American Medical Association*, July 15, 1933, said "There are limitations to and possible dangers from the use of the drug clinically. It should be used only under strictly controlled conditions." In the same issue of that *Journal* is the following editorial comment: "Certainly for the present, at least, such investigations should be largely limited to controlled studies in hospitals by physicians competent in evaluating the effects of the drug, and with laboratory facilities capable of accurately determining blood, body tissue and other changes." It is worthy to note that at least one state has declared the sale of dinitrophenol as a drug under any condition to constitute a felony.

We may also take note that now the narcotic or hypnotic drugs which may be habit-forming are required not only to be named on the label but the text of the Act itself requires the notice "Warning—May be habit forming." Furthermore, products composed of two or more ingredients are required to show the name of each active ingredient, here again making it possible for those who elect self-medication to avoid those drugs to which there is a known idiosyncrasy. Last but not least the old joker with respect to therapeutic claims has been eliminated; no longer does the government have to show, frequently by expensive and time-consuming testimony, that the label of a worthless preparation is both false and fraudulent.

The cosmetic section is a new departure and the one significant clause in this part of the law is that which relates to dangerous cosmetics. Through the inevitable publicity which attended the passage of the new Act, the public became well acquainted with the tragedies laid at the door of paraphenylenediamine eyelash and eyebrow dyes. No longer may a cosmetic move

in interstate commerce which contains any ingredient which is dangerous when used according to the directions on the label, or when used in the customary or usual manner. Seizures were immediately effected of such dangerous cosmetics a few days after this section of the Act became effective in June, 1938. Some of the preparations which were indicted as causing tragedies are no longer obtainable. It is interesting in this connection to call attention to the fact that in the program for certification of coal-tar dyes, no coal-tar dye will be certified for use in the orbital area, or if a dye has been certified and is contained in a cosmetic, for example, recommended for use in the orbital area it will by regulation be

deemed to be an uncertified dye and its use prohibited.

In conclusion, it should be stated that this paper covers by no means all of the provisions which may have a bearing, perhaps indirectly, on public health and welfare, but merely recites the outstanding features from the public health standpoint of this Act of 1938. It is perhaps unfortunate that, with all the deaths and other tragedies attributed to drugs and to cosmetics, it took Congress 5 years to pass this Act, but fortunately it is passed, and even in its imperfect condition represents a substantial measure of protection to health for which the consumer of foods and the user of drugs and cosmetics should be devoutly thankful.

Aspects of Governmental Policy on Stream Pollution Abatement*

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ALL persons and agencies interested in the stream conservation problem are mutually agreed that there exists in this country a pollution situation that is most undesirable and uneconomic; that such conditions are so widespread as to constitute a major national concern; and that such remedial and preventive measures should be taken as to protect the public health, preserve public decency, conserve the wild life resources, and promote the use of natural waters for wholesome recreational purposes. It is ironical and unfortunate that some of these agencies, whose interests and objectives are common, should differ so widely and fight so bitterly over ways and means of accomplishing desirable ends. The greatest contribution that can be made to the cause would be the encouragement of a dispassionate consideration of the opposing points of view and a reconciliation of differences. During the recent session of Congress there have been evidences that feelings are running so high as to develop bitter prejudices, cause misrepresentations of facts, and encourage the widespread release of misleading propaganda. The proper legislative solution of this vexing problem, which requires the ultimate in vision and perspective,

should take place in an atmosphere that is clear and calm.

Before considering the opposing points of view or attempting to weigh existing differences, it would be well, perhaps, to reflect briefly upon the fundamental uses of streams and the general nature of the pollution problem.

THE NECESSARY USES OF STREAMS

The uses to which streams and other natural bodies of water are put are many and various, serving in as many ways the needs of our individual and national life. Due to geographical and topographical conditions, the river basin becomes a kind of closed community so far as water uses are concerned. The stream becomes the source for domestic and industrial water supply, irrigation and hydroelectric power developments; it serves the needs of recreational facilities; it provides the habitat for fish, shellfish, and water fowl; it furnishes the medium for water transportation; and provides the vehicle for the carrying away and ultimate disposal of the liquid wastes originating from our community life and industrial processes.

The use of a natural water course for the reception and disposal of liquid wastes is as necessary and legitimate as its use for any other purpose, subject to definite limitations. If such use renders the river unfit as the source of present or potential public water supplies,

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offends the senses, endangers health, inhibits the growth of wild life, prevents its use for recreation, or obstructs navigation, the development of the drainage area will, as a result, be hindered or even stopped, and all people and properties within the area will suffer. But in emphasizing this danger one must not overlook the possible economic consequences which would result if overzealous demands for a pristine degree of stream cleanliness required a degree of sewage and waste treatment that would be prohibitory to municipal and private enterprise.

The proper balance of stream uses is different for every stream, and for each, depending upon conditions, there is one combination which is most logical and economical. Such a policy does not mean that our water courses need become or remain open sewers. In every case public decency and economy demand a degree of cleanliness sufficient to avoid nuisance conditions, provide recreational facilities, support useful aquatic life, protect the public health, and preserve the natural beauties of water. The solution of the problem lies in true conservation, which implies the maximum possible judicious uses of the many properties of streams, such uses to be evaluated from a consideration of the broad demands of the public welfare. It does not lie in any simple statutory device which attempts to regulate water quality upon the basis of a single water use.

POLLUTION ABATEMENT A PECULIAR PROBLEM

A complicating factor in dealing with stream pollution is the fact that the municipal or private agency making an outlay of money for pollution abatement is not the one which benefits directly from the expenditure. It is the down-stream riparian owners and users of water who suffer from the pollution, or who reap the benefits of its abate-

ment. In an age of exploitation of natural resources this peculiar fact has, quite understandably, caused both public and private polluters of water to dump their wastes in the easiest and least expensive manner, leaving the unpleasant consequences to the users of water on the streams below. In the past they have too often ignored the public interest and the welfare of succeeding generations and have shunned the responsibility of providing pollution relief.

But the days of pioneer exploitation and the advancing frontier are gone. The growth of densely populated and highly industrialized areas has tremendously increased liquid pollution, while the rainfall has remained practically constant, and normal stream flow has actually diminished under the influences of modern land use. The resulting condition is not limited in its effects to esthetics, recreation, or public health; the economic consequences are being felt. Many industries requiring water of high quality for modern processes of manufacture are already suffering great losses by reason of its defilement by their own wastes, or those of sister industries.

It is high time that serious cognizance be taken of the condition and value of the nations streams, and plans laid for the sanitary redemption of some, and for the continued protection of others—plans not only for the present, but for the decades and centuries which are ahead.

EXTENT OF THE POLLUTION PROBLEM

The Third Report of the Special Advisory Committee on Water Pollution of the National Resources Committee, presented to Congress by President Roosevelt on February 15, 1939, contains the most accurate available data regarding the present status of the pollution problem. It estimates that 73,174,000 people of the United States

were served by public sewerage systems as of August, 1938, which represents 56 per cent of the 129,818,000 estimated population of the country at that time. This sewered population discharges daily approximately $5\frac{3}{4}$ billion gallons of liquid wastes, practically all of which finds its way, treated or untreated, into streams, lakes, and tidal estuaries. This enormous flow represents, however, less than $\frac{1}{2}$ per cent of the average daily flow of the streams of the country. The sewage from about 19,000,000 persons is subjected to primary treatment of sedimentation, while an additional 20,700,000 persons are tributary to secondary treatment plants. This total population of 39,700,000 served by some type of treatment works represents about 54 per cent of the sewered population, or approximately 31 per cent of the country's total population. In terms of volume, roughly $2\frac{1}{2}$ billion gallons of sewage are discharged daily in an untreated condition into water courses, while about $3\frac{1}{4}$ billion gallons per day receive treatment prior to discharge. However, it should be borne in mind that these statistics do not paint a true picture of the sewage pollution problem. The Special Advisory Committee is careful to point out that it is not essential that all sewage receive complete treatment and that, under certain conditions, no treatment may be necessary or desirable.

In the field of mining wastes, the committee estimates that annually about 2,700,000 tons of sulphuric acid entered streams as drainage from bituminous coal mines prior to the recent widespread campaign of sealing abandoned workings. From anthracite mining large quantities of culm and acid drainage also find their way into the water courses of this district. The oil fields are estimated to produce daily about 10 million barrels of brine, a considerable part of which drains into streams. In some sections of the country hy-

draulic mining operations continue to contribute materially to the silting of stream channels.

A great variety and volume of liquid wastes are discharged from industrial plants into the streams of the country. No reliable estimates are available as to their amounts, or their specific characteristics and effects, but the committee rated them in descending order of importance as follows: food products, paper and pulp, textiles, petroleum products, and metallurgical products. These wastes are harmful to the receiving streams in a number of ways. They may contain substances causing disease, they may impart obnoxious tastes, odors, and colors, which are revulsive to the senses, render the water unsuitable for industrial purposes, corrode structures, prevent recreational use of the stream, and inhibit the development of fish and other forms of wild life.

COST OF POLLUTION ABATEMENT

The Special Committee estimates that the further cost of treatment works to bring about a reasonable abatement of water pollution would involve an expenditure of approximately \$1,000,000,000 for municipal sewage treatment, about \$52,000,000 for the control of coal mine drainage, not less than \$100,000,000 for the treatment of oil field brine, and approximately \$900,000,000 for the treatment of industrial wastes for which practicable processes have been developed. The annual operating and maintenance costs for the new sewage treatment plants would amount to at least \$15,000,000, while the fixed and operating charges for the treatment of mining, oil field, and industrial wastes would probably exceed \$225,000,000 per year. These estimates of the committee for installation and operation assume that optimum use would be made of the natural purification capacities of streams and that, in many situations, much waste would be discharged untreated or

with only minor treatment. The complete treatment of all wastes is estimated to cost several times more than the programs outlined above. Such a degree of treatment is considered unattainable and, even though it were possible, a program of this extent is not considered necessary.

FEDERAL LEGISLATION

During the past 5 years various bills dealing with the problem of stream pollution have been introduced into Congress. These bills fall generally into two types, representing two opposing schools of thought with respect to regulation, and may be briefly summarized as follows:

The first measure dealing with pollution control was introduced into the 74th Congress by Senator Augustine Lonergan of Connecticut. Largely supported by the wild life conservation group, the Lonergan Bill provided for a central federal regulatory agency to exercise pollution control through injunction procedures in the United States courts.

At about the same time other bills were introduced into the Senate and the House providing for federal participation, through an existing agency, in a program of educational, research, and coordinating activities, but with regulatory control left to the states. These bills embodied the principles considered desirable by the health officials of the country, and were represented in the later Barkley-Vinson measures introduced in the Senate by Senator Barkley and in the House by Representative Vinson.

Neither the Lonergan nor the Barkley-Vinson type of bill received final action during the 74th Session, and both types reappeared during the 75th Session. Late in this session the Vinson Bill was passed by both houses after the elimination of the drastic regulatory provisions attached to it by amendment in the

Senate, and the U. S. Public Health Service was designated as the agency to represent the United States Government in the program. Quite surprisingly, the bill was given a pocket veto by the President on the basis of a technicality, although he voiced hearty approval of its basic objectives and principles.

The 76th Congress saw the early introduction in the House of bills similar to the Vinson Bill: HR 295 (Parsons), HR 922 (Spence), and HR 2890 (Bland). One similar to the Lonergan type, HR 4170, was introduced by Representative Mundt. Later in February, Representative Mansfield, Chairman of the Committee on Rivers and Harbors, introduced HR 4314, the bill suggested by the Advisory Committee on Water Pollution of the National Resources Committee as incorporating the best opinion of federal planning, budgetary, health, and conservation agencies, containing all the basic principles included in the original Vinson Bill, and meeting the technical objections upon which the Presidential veto had been based.

Meantime, Senator Barkley had submitted S-685, the same bill as the Vinson measure of the last session with some minor revisions to remedy partially the criticisms of the President, and Senator Clark had introduced S-1691, another measure similar to the Lonergan bill. The Barkley measure passed the Senate with minor amendments and went to the House, where it was reported favorably after being amended to conform to federal budgetary procedure. This bill was given clearance in preference to HR 6723, a revised bill later introduced by Mr. Mundt, but the adjournment of Congress left it in the category of unfinished business. It will doubtless come before the House for action at the next regular session.

CONFLICTING POINTS OF VIEW

In general, the organized wild-life conservation groups appear to believe

that the only effective machinery for pollution control is a central federal agency vested with broad and arbitrary powers to enforce abatement orders by mandamus procedures in the federal courts. They select the U. S. War Department as best qualified to administer the program. They profess a lack of confidence in the ability of state and local governments to enact adequate and uniform laws for the abatement of pollution or to enforce such laws even though they were on the statute books. Furthermore, they charge federal and state public health agencies with an unsympathetic attitude toward pollution abatement, disparage the achievements of these organizations in preventing and relieving pollution, discount the value and applicability of their research developments, and actually accuse these public agencies of bad faith in dealing collusively with offending industry.

On the other hand, all of the public health agencies of the country, all federal bureaus and departments concerned with water quality and use, such planning agencies as the National Resources Planning Board, and the President of the United States, apparently favor a type of legislation which gives to the U. S. Public Health Service certain functions and responsibilities pertaining to research, education, stimulation, and coördination, but leaves to the states, or authorized interstate agencies, the powers of regulation and control.

Those who have had most experience with problems of this nature subscribe to this latter policy as being most logical, reasonable, and, in the long run, most productive of satisfying results. Although the advocates of rigid federal regulation may not be entirely without justification for their impatience with existing conditions and their cynicism with respect to the future effectiveness of state control, it is believed they may be laboring under certain illusions in their active legislative campaign.

Admitting the possibility that any commentator on so controversial a subject may have predilections that sway him from a course of strict neutrality, the writer ventures to examine a few of the points at issue between the two schools of thought:

Federal vs. State Powers—The power delegated to Congress by the commerce clause of the Constitution is limited to commerce between the several states. Under this authority the federal government now exercises control over the discharge of refuse matters, other than liquid wastes, into navigable waters, and the Oil Pollution Act of 1924 rests upon this clause for its constitutionality. The same justification might apply to pollution of navigable streams by domestic or industrial wastes where such discharge constituted actual and appreciable hindrances to navigation, such, for example, as sludge banks in ship channels. However, isolated cases of this kind would not appear to authorize the taking over of the entire field of pollution control by a federal agency. Since international treaties become the supreme law of the land, without question of constitutionality, the Congress has power to control pollution in so far as necessary to fulfil treaty obligations relating to boundary waters, regardless of whether such streams are navigable or intrastate in character. The federal government has the power to regulate pollution on the public domain and exercises some indirect control over water quality through the "beneficial public uses" clause of the Federal Power Act. Its domestic quarantine powers give it authority to approve the safety of water used for drinking and culinary purposes on interstate carriers, and, under voluntary agreements with the various states, it enforces regulations regarding the certification of interstate shipments of shellfish. Aside from these limited powers, in the opinion of leading authorities, there appears to be no con-

stitutional authority for federal water pollution control.

The authority of the states over such intrastate matters as stream pollution is well established, and cannot be taken away. State legislatures, by exercise of the police power, may enact statutes relating to pollution control or may delegate to agencies of the state the authority to formulate and enforce regulations pertaining thereto. However, the federal government does have the authority to conduct scientific and technical investigations relating to water pollution, to coöperate with the states in an advisory capacity, and to render financial assistance to state and local authorities for investigative and construction purposes. There is strong opinion that, regardless of legal powers, this indirect type of participation by federal agencies would result in a more effective and orderly program of pollution abatement than could possibly be achieved by federal domination.

Efficacy of Centralized Control—It is only natural that those observing the sad plight of prostituted streams should infer that the trouble lies in the inefficacy of control machinery under our system of federal and state division of responsibility. There comes the urge to scrap the machinery and build on a different design. It appears doubtful that our state-federal form of government is responsible in any large measure for the present situation. The pollution problem is old and worldwide, and for almost a century the countries of Europe have been wrestling with the legislative and administrative phases of pollution abatement. No nation has yet developed a workable plan for reconciling satisfactorily the various conflicting interests in natural waters to provide maximum judicious use for the greatest public benefit. It appears that the record in small highly federalized countries is no better than in those where the legislative and en-

forcement responsibilities are dispersed.

The explanation of the condition lies not so much in the deficiency or obsolescence of control machinery as in the extreme complexity of the problem, the multiplicity and conflict of interests, and the fact that pollution is only one phase of the larger problems of the conservation and maximum advantageous use of our water resources in general. A change in this condition will not result spontaneously from any device of centralizing power and responsibility. It may be expected to come gradually from the extension of powers on all levels of government, by fitting pollution control into its proper place in the broader control program of planned conservation and use of all water resources, by constant educational and promotional work of all interstate agencies, by relentless attacks along the whole front of the water problem by local governments under the guidance, stimulation, and participation of federal groups, by the promulgation of interstate compacts and agreements, and by financial assistance from the federal government to public and private polluters requiring such aid.

Enforcement by Mandate—To the provoked and impatient the correction of public evils by mandate has the appeal of being quick and effective. Regulation appears on the surface to be a simple device for curing all ills. Critics proclaim: "There ought to be a law." Perhaps it would be well to remember other times in our national life when similar evils have been observed, and when the laws designed to provide the perfect panacea proved to be unenforceable and disappointing. Moreover, those who have had occasion to invoke the police power of government in dealing with the public have long ago learned that the mailed fist is less productive than the velvet glove. Public psychology reacts adversely to arbitrary force. Persuasion, education,

and coöperation are more effective instruments than the "big stick," and the power of law should be held in reserve for exercise only when milder measures fail. The Lonergan, Clark, and Mundt types of legislation provide for actions in equity to be brought in the federal courts and instruct United States attorneys to institute such actions when requested to do so by the Secretary of War or any one of the district boards. These bills appear to remove all existing authority of the states over sewage and waste treatment plants and place their operation directly under the supervision of the Chief of Engineers, except for those waters ruled not to be navigable.

Although these bills carry provisions for coöperation with state agencies, for advisory services of other federal agencies, for the collection and dissemination of information, and for federal financial assistance, it is feared by many that the emphasis upon drastic control by court action would result in inadequate investigations of actual stream requirements and of the economy and applicability of treatment processes. Precipitate action without complete information would result not only in mental anguish but in the gross waste of public and private funds. Enforcement of the provisions of these measures with respect to new or additional pollution would tend to hinder industrial development and municipal growth, and might preclude the extension of sewers to presently unsewered and insanitary communities. In any case, such measures would be concerned with pollution alone and would neglect consideration of the many other related and inseparable problems of water conservation and use.

Pollution Primarily a Health Problem

—There can be no doubt that among the many objectionable and hazardous effects of water pollution the interests of the public health are paramount. Even the most ardent angler must recog-

nize that, in the general economy of a stream system, the uses of water for such vital needs of life and health as public water supply and the ultimate disposal of domestic wastes are of supreme significance. And when the health interests in a stream are adequately safeguarded there is usually the consequence that the quality standards of water for other uses are automatically met. It is therefore only reasonable and proper that the administrative responsibility for pollution control should be vested in federal, state, and local health agencies.

In their criticism of the Barkley-Mansfield type of bill, sponsors of the Mundt legislation disparage the splendid research accomplishments of the U. S. Public Health Service in this field and charge health agencies in general with indifference, inefficiency, and bad faith in dealing with water pollution. The charge has been made repeatedly that health organizations are in league with industrial polluters in conducting "study clubs" for the indefinite and wilful delay of corrective measures. All who are acquainted with the records of the U. S. Public Health Service and state health departments will recognize such statements as false and libelous. There is probably no organization in the world that has excelled the record of the U. S. Public Health Service in the development of fundamental knowledge in the realm of stream pollution, water and sewage treatment during its 26 years of intensive and basic research on these subjects. The critics appear to be so unacquainted with the technical bases of pollution abatement as to fail even to recognize that the scientific problems are difficult, complex, and slow of solution. They remind the writer of an impatient textile executive who said that he could take a good chemist and solve all the waste treatment problems in his industry in 30 minutes.

Army Engineers or Public Health

Service—Sponsors of the Mundt and Clark Bills insist that federal control be vested in the War Department in the interest of rigid enforcement, and cite many other reasons why the Army engineers should be placed in charge of the program. Without disparagement of the splendid record of the Corps of Engineers in their field of responsibility, it can be stated that not one of these reasons is valid. It is notable that there is missing from this list of reasons the primary one which should govern the selection of any federal agency to perform a particular task, namely, the availability of personnel having the viewpoint, training, experience, background, and technical equipment to handle the problem. These resources for pollution control have been built up by the U. S. Public Health Service over a period of more than 25 years, during which time, with meager appropriations, they have assembled a highly qualified organization and established an enviable record of useful accomplishment. This work has been quiet, largely intangible, and removed from public view—a reason, perhaps, why the tangible and costly construction projects of the Corps of Engineers should give some people the idea that this agency is vastly superior in its ability to get things done.

As a matter of fact, in all stream investigations in which the Corps of Engineers and the U. S. Public Health Service have participated jointly, the Corps has requested the Health Service to handle all phases of the work pertaining to pollution, stream quality, and abatement recommendations. It is presumed that this has been done because they feel that the Health Service is much better equipped to do the job. In any type of program the Army engineers would continue to handle matters relating to hydrology, maps, channel structures, channel configurations, etc., but it is certain that they would be the last to claim their superior qualifications

to deal with the complex problems of pollution. It is apparent that the real reason for the opposition to the U. S. Public Health Service is the fact that this agency does not subscribe to the extreme views of a few groups interested in only one phase of the problem. Through more than 50 years' fruitful participation with states in regulatory measures for the improvement of the public health and welfare, the U. S. Public Health Service has gained the full faith and confidence of the people of the nation. It is logical and expedient that it should represent the federal interests in any pollution abatement program.

Progress in Pollution Abatement—Advocates of the plan of rigid federalized control-by-injunction maintain that the streams of the country are in such appalling condition as to constitute a threat to civilization, and are becoming progressively worse, as a result of the inherent impotency of any state system of regulation and the utter indifference and ineffectiveness of local enforcement agencies. In this connection it is enlightening to look at the record.

According to the report of the Special Committee on Water Pollution, more progress has been made in municipal pollution abatement during the past 6 years than in the preceding quarter of a century. Since 1932 the population tributary to treatment plants has increased from 21,500,000 to 39,760,000, a change from 35 to 54 per cent of the sewered population of the country, or an increase from 17 to 31 per cent of the nation's total population. Within this period, and in the face of a rapidly increasing population and tremendous extension of sewer service, the sewered population not served by sewage treatment plants has been reduced from 40,500,000 to 33,414,000. This has been accomplished at a cost approaching one billion dollars.

In the State of Ohio, for example,

during the 12 year period, 1928 to 1939 inclusive, 160 municipalities have constructed sewage treatment improvements costing about \$40,000,000 (exclusive of costs for collecting sewers, interceptors, etc.,) serving 3,223,000 people, or nearly 50 per cent of the state's population. In the State of New York, between 1933 and 1939, 102 municipal sewage treatment works have been built at a cost of more than \$38,000,000, and serving 2,854,000 persons. Together with the 161 plants installed in the preceding 30 years, these works now treat the sewage of 263 cities and towns, representing a population of 5,400,000 people, or 78 per cent of the entire sewered population of the state. New York City's 10 year program for cleaning up the pollution of that area at a total cost of about \$150,000,000 is proceeding on schedule, and several large plants have been placed in operation. The great abatement program of Chicago is essentially finished, and those of other large centers of population and industry are proceeding apace. Proportionate progress is being made in other regions of the country.

While an important impetus to this recent progress may be attributed to the availability of federal grants-in-aid, most of the credit should probably go to the behind-scenes educational and promotional activities of public health agencies which have been relentlessly carried on. And another important reason for progress lies in the realization by municipalities and industries of their moral and legal responsibilities in pollution abatement. While the progress made in the treatment of industrial wastes has not been so outstanding as that in the municipal field, many new plants have been constructed, and the general indifference of industry is noted to be rapidly disappearing.

The Federal-State Pattern of Cooperation—During a period of about 50 years, there has been developed a plan of action and cooperation between

federal and state authorities on all matters pertaining to the public health that has effected a closely-linked relationship and results of most satisfying and significant values. In essence the plan involves the provision by the U. S. Public Health Service of (a) research services to develop scientific facts and procedures, (b) safe and uniform standards, (c) guidance in methods and procedures, by expert technical assistance, and (d) financial assistance; while the responsibility for legislation and administration of the programs is left with state health agencies. Notable among the achievements in the sanitary field of this working arrangement have been: the improvement of drinking water quality, with consequent decrease of the intestinal diseases, through the application of the Treasury Standard; the successful attack on the malaria menace of the South through the use of scientific facts, methods and procedures developed by the Public Health Service; the unprecedented advance in safe milk production through the adoption of the U. S. P. H. S. Standard Milk Ordinance; and the protection against infected shellfish by the application of standards pertaining to sources, production, and marketing. In all of these activities, and many others, the U. S. Public Health Service has developed the scientific facts and shown the way; the states have accepted guidance and executed programs with enthusiasm and efficiency. There is every reason to believe that this plan is the best one that can be conceived for dealing with the problem of stream pollution abatement.

CONCLUSIONS

The foregoing discussion indicates the author's belief in the following principles relating to the administration of a national program of pollution abatement:

1. That a stream must be recognized as supplying various important needs within the drainage basin, and that all these uses must be considered and balanced.

2. That one of the natural and inescapable uses of streams is for the reception and ultimate disposal of liquid wastes produced on their watersheds, after such treatment as may be required.

3. That the self-purification capacities of streams must be utilized to a greater or less degree in all cases, alone or as an adjunct to treatment processes, and that complete treatment of all wastes is neither economically possible nor scientifically necessary.

4. That control of pollution by the injunction process, administered by a federal agency, is of doubtful constitutionality, contrary to the principles of democratic government, wasteful of money and ineffective in its prospect of satisfying results.

5. That regulation of pollution is a proper function of state government, and that a federal agency should operate in an investigative, stimulative, and coordinating capacity, with financial aid furnished for administrative and construction purposes.

6. That the vexatious problems of pollution in interstate waters can best be solved by an extension of the system of interstate compacts and agreements.

7. That the most important factors in pollution abatement are those related to public health, and that health agencies should have the responsibility of administering the program.

8. That the U. S. Public Health Service is best qualified to represent the interests of the federal government, and that the pollution abatement program should be conducted

in coöperation with state health agencies along the lines of the "Federal-State Pattern" which has been found so effective in other similar undertakings.

9. That with a national campaign conducted under such a plan, and with reasonable availability of federal funds for loans and grants-in-aid, the future progress in pollution abatement should be comparable with that of the past 6 years. At this rate, within a period of 5 to 10 years the more objectionable conditions of sewage and industrial waste pollution should be corrected.

REFERENCES

1. *Third Report of the Special Advisory Committee on Water Pollution of the National Resources Committee. House Document No. 155, 76th Congress, 1st Session.*
2. *Report of Hearings Before Committee on Rivers and Harbors of House of Representatives, 76th Congress, 1st Session, on HR 295, HR 922, HR 2890, HR 4170 and HR 4314, March 3 and 6, 1939.*
3. *Report of Hearings Before Committee on Commerce of U. S. Senate, 76th Congress, 1st Session, on S 1691, March 22, 23, and 27, 1939.*
4. *Congressional Record, 76th Congress, 1st Session.*
5. Tarbett, R. E. *National Aspect of Stream Pollution, Presented before Annual Meeting N. C. Society of Engineers, January, 1939 (Unpublished).*
6. Saville, Thorndike. *Administrative Control of Water Pollution. Interim Publication of Am. Inst. Chemical Engineers, Nov. 3, 1931.*
7. Wolman, Abel. *What Can Be Done About Stream Pollution. Proc. Am. Soc. C. E., 64, 1:64 (Jan.), 1938.*
8. Wolman, Abel. *State and Other Governmental Functions in the Control and Abatement of Water Pollution in the United States, Chapter XXV, Modern Sewage Disposal, Federation of Sewage Works Associations, 1938.*

DATA CONDENSED FROM THIRD REPORT OF SPECIAL ADVISORY COMMITTEE ON WATER POLLUTION OF NATIONAL RESOURCES COMMITTEE, HOUSE DOCUMENT NO. 155, 76TH CONGRESS, 1ST SESSION, 1939

I. STATUS OF WATER POLLUTION IN UNITED STATES, 1938

1. *Municipal Sewage:*

Total Population of United States	129,818,000
Urban Population (Incorporated Places in Excess of 2,500)	73,200,000
Served by Public Sewers	73,174,000
Per cent of Total Population Served by Sewers	56
Population Tributary to Primary Sewage Treatment Plants	19,000,000
Population Tributary to Secondary Sewage Treatment Plants	20,700,000
Total Population Served by Sewage Treatment Works	39,700,000
Per cent Sewered Population Served by Treatment Works	54
Per cent Total Population Served by Treatment Works	31
Daily Discharge of Untreated Sewage, gallons	2,500,000,000
Daily Discharge of Treated Sewage, gallons	3,250,000,000

(NOTE: These statistics cannot give accurate representation of pollution problem. It is not essential that all sewage receive complete treatment and, under certain conditions, no treatment may be required. The reasonable self-purification capacities of streams should be utilized.)

2. *Mining and Industrial Wastes:*

Acid Mine Drainage from Bituminous Coal Fields, tons H_2SO_4 /year	2,700,000
Culm and Acid Drainage from Anthracite Coal Fields	Unknown Amount
Brine from Oil Fields, barrels per day	10,000,000
Debris and Silt from Hydraulic Mining Operations	Unknown Amount
Industrial Waste from Manufacturing Processes	Unknown Amount

(NOTE: Waste-producing industries account for about 75 per cent of manufacturing activity of U. S., with an annual value of production of 18 billion dollars and with an employment of about 3 million persons.)

II. ESTIMATED COST OF POLLUTION ABATEMENT

1. *Municipal Sewage:*

Cost of Additional Sewage Treatment Plans	\$1,141,000,000
Annual Operating Costs of Additional Treatment Plants	15,000,000

(NOTE: These estimates based upon degree of treatment considered necessary and reasonable. If complete treatment were applied, additional capital cost would be about \$2,000,000,000 and annual operating cost about \$30,000,000.)

2. *Mining and Industrial Wastes:*

Cost of Acid Control at Abandoned Bituminous Coal Mines	\$ 12,000,000
Cost of Corrective Treatment at Anthracite Coal Mines	40,000,000
Cost of Treatment Plants for Oil Field Brines	100,000,000
Cost of Industrial Waste Treatment Works	900,000,000

Total Capital Costs	\$1,052,000,000
Annual Costs of Mining and Industrial Waste Treatment	225,000,000

(NOTE: These estimates do not contemplate complete treatment of all wastes, but assume optimum use of natural purification capacities of streams.)

3. *Recapitulation:*

Capital Cost of Necessary Treatment Works	\$2,193,000,000
Annual Operating and Maintenance Costs	240,000,000

III. PROGRESS IN POLLUTION ABATEMENT IN UNITED STATES

Year	Sewered Population	Tributary to Treatment Works	Population Tributary to Treatment Works	
			Per cent of Sewered Pop.	Per cent Total Pop.
1904	28,000,000	1,100,000	3	1.2 (approx.)
1910	34,700,000	3,900,000	11	4
1932	62,000,000	21,500,000	35	17
1938	73,174,000	39,700,000	54	31

Some Essentials in Training for Public Health*

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THE task of arranging and effecting adequate training for public health officers is a duty for which we are likely to be held answerable by a mystified and impatient public for some years to come. Until every state is able to provide from its native sons and daughters its future health officers and personnel, to train them, and to give adequate employment to most if not all so trained, we may confidently expect much more than local interest in the performance of our schools or courses of training for public health work.

Outsiders interested in the performance of a school are not likely, however, to take a sentimental or overly sympathetic attitude toward the discrepancies between results sought and results obtained. State governments seeking competent health officers are not well impressed by excuses. Forceful needs do not adjust their demands to the limitations imposed upon a school of public health by insufficient personnel, inadequate income, personal jealousies, or lack of administrative foresight. Outsiders looking for competent health

officers are impatient of those deformities and inadequacies in a school which we may explain as "due to historical development." To put it in other words, any course or school for the training of public health officers is certain to live during the next 20 years in an atmosphere of lively criticism—at times vague, unreasonable, and unsympathetic; at times accurate and merciless; but nearly always inescapable—in fact, healthy and stimulating by virtue of its appreciation of positive performance and its disinterest in explanations.

So great is the likelihood of our being held responsible for a better performance than is likely to occur in a climate of inadvertence or of unreflecting faith (alternating with self pity), that it could be useful to give our attention to this query: What are the simple essentials of education for public health?

I take it that the elements of an educational process are simple and straightforward. They are to be found in the nature of the students, in the nature of the teachers, and in the character of the contact between students and teachers. Time will not permit detailed and properly qualified statements on each of these factors. It must suffice to make a few comments

* Read at the General Session on Professional Education of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 18, 1939.

upon the more important aspects of each.

The nature of the students resolves itself into their innate or natural abilities, their motivation and their previous training. In each of these qualifications we are dealing with what comes to us in large measure already formed, and therefore our most immediate task is largely that of selection.

As for the point of natural ability, I wish that the standard of performance in the course of preventive medicine in every medical school were as severe, rigorous, and important a criterion of a student's character and claim to a degree as any course in the school. And I wish that the schools of public health rejected a larger percentage of applicants and failed say 20 per cent to 40 per cent before graduation. For let us not forget that every incompetent we release into the field of public health discourages 5 to 50 better men by his colorless example and later may also obstruct the recognition and promotion of competent juniors from an all too justified feeling of his own insecurity.

As regards the motivation and sympathies of the students I have come to be a blunt heretic. A friend of mine conversing some years ago with King Albert of Belgium heard with some surprise the King say "A government which holds its chief concern to be the welfare of the people is a good government whether its form be Communist, Fascist, or Democratic, and a government which neglects the welfare of the people, whether it be Democratic, Fascist, or Communist is a bad government."

I believe that single-minded, simple, and direct concern for the welfare of the people is, as a motive in American medical schools for the guidance and stimulation of students, in part neglected and in part eclipsed by preoccupation with the demands of technic and science, and both to the

detriment of the public health of our nation. Furthermore I believe that among first year students there is scattered more potential concern for public health and public welfare than is to be found in their fourth year. Until we cease ignoring the validity of sociology, psychology, anthropology, economics, government, and even comparative religion as subjects for student concern, we shall remain responsible for reducing the valences of the profession, and reducing instead of expanding the variety and excellence of the physician's capacities to combine with the public for the common welfare.

It is already clear that the present expense of a medical education has begun to affect the selection of medical students and to show not only in the predominantly upper middle class origin of medical students, but also in the predilection for the lucrative forms of practice on the part of those who may have been obliged to borrow the funds for their education. I raise serious question as to whether substantial scholarships in the schools of public health would not valuably counteract the selection which now is in force. We might reflect upon the form of appointment to the free education at Annapolis and West Point for comparison. How can we expect understanding of the underprivileged to emerge strong and tenacious and self-respecting among students who have never been underprivileged? We may expect a student to have sympathy of a sentimental sort—but not the simplicity and conviction of understanding born of experience.

The previous training of the student coming to the medical school has often more than enough of chemistry, usually enough physics and biology, but not enough mathematics, sociology, psychology, anthropology, economics, and English for his needs as a public health officer. The previous training of an

entrant to a school of public health is usually defective by reason of the status accorded to public health in his medical school. It is often then too late to change the system of values he has picked up.

I see some real advantage in assuming without rancor or recrimination that a medical course centered upon the training of men to cure illness for fees will not be naturally inclined to provide time or an adequate point of view for training men for quite a different purpose, the prevention of disease as a public salaried servant in an environment where statesmanship, social sympathy, and educational skill are also paramount qualifications. I see particular advantage in assuming that our present medical education suffers from the defects of its qualities. Such an assumption leads to the realization that improving the medical school courses in public health and preventive medicine is the decisive opportunity we have under the existing circumstances to improve recruitment and eventual performance of public health personnel.

The second element of the educational process I hold to be the nature of the teachers of public health. There again as with the students we must consider their capacities, their interests, and their training or experience. During the next 20 years we shall apply the existing practices in the selection of teaching personnel in medical schools and schools of public health, or we shall devise new forms of selecting our teachers. I hope that the criteria for professional appointment and promotion will be first: *Has he added to the knowledge in his field?* second: *Does he teach out of stimulating experience?* and third: *Is he locally convenient, congenial, coöperative, inexpensive, et cetera?* And I hope the qualifications in capacity and maturity and experience of every possible *candidate* for major teaching appointments will be a

matter of wide discussion and continual investigation throughout this country so that university committees or deans charged with finding the best man available will be rewarded and not disappointed or disillusioned by extramural search and consultation.

For the training of teachers of public health in medical schools and schools of public health the preparation should be both long and broad—probably more intensive for the special men in the schools of public health and more varied and even longer for the men going into the medical schools as professors of the subject there. In order to offer adequate experience as well as a sufficient time in prearranged training, departments should have 2 to 5 positions subordinate to the full professorship and should detail their men for periods of work in city, county, state, and federal positions which give crude, direct, and realistic experience in field work. We have not yet solved the riddles of the best relation between laboratory and field work, between theory and practice, but we would be wise to explore further and report to each other our findings in this important field for discovery. I should consider interchange of junior personnel with active field units as well as with other university departments to be of the greatest value in building up the ranks from whom the future professoriate may be chosen.

The third element of educational success was noted as being the conditions under which students and teachers come together and work. This also is hard to dispose of as briefly as the limits of this talk require. I have preferred to describe as essential the conditions under which students and teachers come together and work since the finest and most valuable educational experience escapes the terminology of curriculum makers and devisers of degrees. But so serious

has grown the multiplication of degrees in the field of public health that a few comments present themselves on the subject of degrees, diplomas, certificates and the like, inadequate as they are to describe the conditions under which teacher and pupil are supposed to have met and worked together.

I take it that the purposes of a school in giving a degree or certificate are neither single nor simple. In some ways degrees are like paper money, a system of tokens, promises, or equivalents, as good and as variable as the resources of the issuing agencies. They are not the solid metal of ability or maturity. That metal is always in demand. They follow Gresham's law, and, like all tokens, are subject to counterfeit. Of course degrees serve intramural purposes in acting as a framework for courses and plans of work. They also serve as an attraction and reward for student performance. Sometimes they may be hardly more than the *quid pro quo* exchanged for conscientious attendance and the payment of tuition fees. But nonetheless they have quotation in the world outside. And then the trouble begins. Is the D.P.H. of the University of Balaclava as good as the C.P.H. from Karshish College? Why? What does a Diploma in Public Health mean? If the D of M.D. means Doctor how is the public to be expected to know that the D in D.P.H. mean Diploma? Do not doctors get diplomas when they graduate? May D stand for deception? And certificates in public health—do they assure a knowledge of statistics or guarantee an ignorance of medicine? Always? Sometimes? Or never? Does the Dr.P.H. really exclude the possibility of flagrant incompetence or is it sometimes rather a proof of some exceptional special ability? Can we deny the confusion there is to laymen in such a mixture of certificates and diplomas among bachelors, masters, doctors, and

doctors who are not what the layman calls doctors at all? Without deceiving ourselves at all we shall manage to mislead the public as the initial step in serving them. We cannot just assume that the triumphs of preventive medicine are so great as easily to survive the ludicrous spectacle we present of 13 different degrees in public health given by 10 different institutions in the United States.

Something far simpler is needed by the public we want to work with. Let us start our service by being simply understood in the estimates we make of our pupils' qualifications. What are the essential needs? What would the public understand?

The individual not possessing a medical degree who spends at least a full year in public health courses designed for his or her level of training, and who passes appropriate tests, practical as well as oral and written, should be given a certificate or master's degree in public health. I do not believe in any title for studies over a shorter period than a year. Why should we underwrite inadequacy?

The degree of Doctor of Public Health should be confined to persons already possessing the M.D. and should be so planned and so awarded as to constitute a guarantee of competence to undertake the duties of health officer in city, county, state, and federal health services. It should involve field experience as well as university instruction and be an assurance comparable to and perhaps better than that given by the specialty boards now and in the future in other fields of medicine.

In all matters of licensure, certification, and degree giving, it is remarkable to see how common is the confusion between what is intended to give protection to the public and what is intended to give distinction to the individual. Both types of denomination have very great value to science and to

society at large. But it is the hallmark of educational stupidity to withhold distinction from the onesided specialist or to imply all around competence where it does not exist. Both kinds of degrees should be rigorous if they are to convey an honorable status to the recipient. The difference between what I call distinction and all around competence lies in the measure of responsibility the recipient may be expected successfully to assume for the manifold and variant duties of a health officer. I should like to see the C.P.H. or M.P.H. and the Doctorate of Public Health and only these, as rigorous guarantees of measured and certain degrees of competence. For distinction, however, as a specialist or contributor to knowledge in some special field, it would be valuable to have the Doctor of Science in Public Health. Then the public could begin to know where we are and what to look for as qualifications.

As a degree of special distinction and difficulty the Doctor of Science in Public Health could be honestly given in a few medical schools and the schools of public health. It would be of use in training and denomination of candidates for professorships and positions in research laboratories. It should be neither common nor easily obtained and thus become a mark of acknowledged competence in research and scholarly attainment.

This is all the public can both under-

stand and respect. For in the oncoming realities of public health, what will make the difference is the lay and professional opinion held of teachers and practitioners of preventive medicine and public health—of their native ability, of their characters, and of the excellence of their training or the breadth of their experience. Let us see to it that our degrees exactly reflect such opinions.

We need not go beyond that. I am not concerned here with "credit hours" nor the itemized content of the curricula. What seems important to me I have mentioned—that we pay attention to the capacities, motives, sympathies, and previous training of our students; that at present we accept fewer candidates for degrees because we know that quality attracts quality and imitations will discredit us and ruin the status of our degrees; that we give the most serious attention to the preparation of future teachers, especially in the medical schools; that we realize that degrees have meaning outside as well as inside the institution and that they are only valid when they are understood, and valuable as long as they stand sincerely for the things of real value—capacity, sympathy, and experience. And above all let us seek for simplicity, thoroughness, and realism in the service we offer to the public in teaching its servants a kind of medicine still new and still under-rated.

The Trained Worker Goes to Work^{*}

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IT has been my privilege for some years to be associated with both the producing and the consuming ends of public health work. I have been a city health officer and have done part-time public health teaching both to medical students and health officer trainees. My present work brings me in close touch with public health officials, especially in the western states. The following observations are entirely empirical, but are based upon experience and sympathetic analysis.

First, it must be said that the presence of trained young men in the field is rapidly changing the whole public health picture. It reverses the vicious cycle which has hindered us so long; that is, health officer incompetence, insecure tenure, inadequate appropriations, lack of results, still less adequate appropriations, greater incompetence, less secure tenure. Many have felt that this cycle could best be broken by increasing the competence of the health officer, since this will generally improve results and thus lead to increased appropriations and improved tenure. These more competent young health officers are reversing the process described by Dr. Gregg by *encouraging* "five to fifty better men" to enter the field, and by *accelerating* the "recognition and promotion of competent

juniors." They are also improving the status of our profession in relation to other professions, especially practising physicians, teachers, and statesmen.

It is a pleasure to report that these young men are generally well trained in the scientific aspects of their work. They have learned remarkably well what public health stands for and what it aims to do. They show a surprising ability to apply their clinical experience to public health work and to think of the health of the group rather than of individuals. This is a great tribute to their teachers.

NEW HEALTH OFFICERS' PROBLEMS

Their problems are largely those of application. They know pretty well what to do, but not always how to do it. Hence, their major problems lie outside the field of their scientific training. These problems may be classified under four headings: statesmanship, education of the public, administrative, and personal. Their professional public health problems are less troublesome, less time-consuming, and less menacing than these.

Statesmanship—A surprising number of problems have to do with statesmanship. These include such matters as health officer relationships with superiors and colleagues in the local governmental unit, with medical societies, other organized groups, and with people generally. Analysis of mistakes made in handling these problems

^{*} Read at a General Session on Professional Education of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 18, 1939.

usually discloses lack of understanding of individuals or groups, often a lack of tolerance for those holding divergent views, sometimes unwitting or injudicious involvement with entangling alliances.

Professor Terman,¹ who has followed a group of gifted children for more than 20 years, concludes that given superior intelligence, "then the social factors and ambition, drive, and emotional balance are the main determiners of success and failure." In other words, the ability to work with people is important, in addition to intelligence. Whether we can teach the technics of working with people may be open to question, but it is a quality which should be a prerequisite to a health officership.

Ability to work with people is but a part, though an important part, of health officer competence. One health officer, now gone, lacking both competence and appropriation, took me to a meeting of his appropriating body. He was greeted by the chairman, saying, "Hello, Doc, what can we turn you down on today?" followed by three defiant, long-distance shots at the cuspidor by other members of the board. He did not get what he asked for. Another health officer of my acquaintance, known nationally for his competence and achievement, and, incidentally, lacking any academic public health degree, has had to explain to his appropriating body more than once why he considers it unwise for them to increase his salary. What is our training doing to increase the number of health officers like the latter and decrease the number like the former?

Is it possible that the public health professor's own secure tenure gives him a fine disdain for what he calls politics?² Is this disdain unconsciously transmitted to the student with the result that the ability to work with people is undeveloped and his competence thus hampered?

Two-thirds of the name "public health officer" consists of "public officer." Perhaps two-thirds of his duties consist of being a "public officer." But more than two-thirds of his training is on "health," a third of his title and perhaps only a third of his duties.

Education of the Public—Educational problems are often unrecognized as such by the recently trained health officer, but they exist in profusion. What appears to be lack of public support is often an educational problem of the first magnitude. The task of presenting health department objectives and needs convincingly at all times is largely an educational process. Leading the public to better health habits, improved health attitudes, enlightened health knowledge, and improved health behavior, all require educational ability. To do these successfully, the health officer, like the educator, must:

1. Determine, and limit himself to the hearers' ability to understand.
2. Adhere to simplicity for each level of understanding.
3. Remember that his criterion of success is the extent to which his presentation changes the recipients' choices, actions, and attitudes, not the effectiveness with which the known body of knowledge is summarized.
4. Aim for a lag between stimulus and response so that the response becomes a conscious, intelligent control over conduct, instead of being instinctive or habitual.
5. Start with the intellectual approach, devoid of emotion, in order to avoid emotional fixation. Emotional fixation is the method of dictators. Rather than being educational, it blocks further education.³

These are well recognized procedures in the teaching profession.

Educators have made great advances in understanding the learning process. They analyze and avoid the subversive forms of propaganda. They recognize that experience is the only real teacher. It is the aim of education to use the learner's own experiences to produce education. These are principles in-

herent in the educational process, regardless of the learner's age. They apply not only to school children but to adults as well. That the health officer needs these principles is apparent when we observe the sins committed by many in the name of health education. Among these are:

1. Evangelism, or direct emotional appeal. This is often effective to attain immediate ends, but it is far from education.⁴

2. Oracularity, in which the health officer, like many other physicians, seems to have an insatiable craving to tell others of his superior knowledge. This has led to the slang defensive phrase of youth, "Are you telling me?" Many dislike to be "told." When they are told, it seldom influences their choices, actions, and attitudes; hence, it is not education.

3. "Talking down" to groups. This is invariably distasteful and not education.

4. Talking over the heads of groups. This sometimes leads to desired results, but is bad manners and not education. When it leads to results, it is because the listeners believe in the sincerity of the speaker, not in what he says.

5. Failure to use health service as an educational instrument. Every service rendered by a health department has potential educational value, but it becomes educational only by the deliberate planning of those in charge. A health department vaccination clinic may result in many protected people, but it has educated its patrons only if they are thenceforth more prone to seek and obtain vaccination of their own volition.⁵

Medical schools have been slow to adopt the technics of modern education. Will public health schools do likewise?

Administrative—Administrative problems, though less frequent than political and educational, are often unrecognized or badly handled. No full-time health officer works without subordinates, and the further up the ladder he goes the more personnel he has to handle. Industrial relations or personnel management is no longer a rule-of-thumb procedure. The health officer is entitled to something more than learning by chance or by example (which may be bad as often as good) what is

commonly accepted as good management.

Good business sense is often lacking in health officers. Appropriating bodies are prone to consider the young health officer an earnest, agreeable fellow, but "no business-man." Some knowledge of bookkeeping methods, of cost accounting, taxation and public revenues, values of and responsibility for public funds and property are nearly as essential to the health officer as a knowledge of laboratory procedure and computing vital statistics. Business acumen will earn the health officer the respect and support of his superiors, colleagues, and subordinates.

The health officer is, then, of necessity, a business-man. Has he benefitted from association with teachers of business administration?

Personal — Finally, a few health officers seem to lack genuine, impelling faith in the cause. That their number is small is a tribute to public health teachers and to those responsible for selecting trainees. These few have somehow escaped the conviction that the game is worth the candle. One wonders if they will have the fortitude to withstand the woes which are inherent in any public service and are indigenous to public health. No group in this country has shown greater courage or greater devotion to a public cause than the old-time health officers who have held office for many years. They have borne, with little complaint: insecurity, inadequate income, niggardly appropriations, political and personal vituperative attack, changes of superiors with each political upheaval, the demands of an exacting and none too considerate public, the irritation of public and official stupidity, the dangers of deadly epidemics. One hopes that among our recruits of today we are numbering and developing more Chapins, Bundesens, Chesleys, Emersons, Bishops, Browns, Parrans, Mc-

Cormacks, and Godfreys.⁶ It seems essential that somewhere in the course of his training every student should be inspired by that faith in the cause which comes from inspired teachers and associates who "teach out of stimulating experience."

SUMMARY

These observations on the political, educational, administrative, and personal problems of our younger health officers lead to the following suggestions by way of summary:

1. We must all agree with Dr. Gregg's plea for better selection of candidates for health officer training. Under present arrangements for federal aid, this is not entirely the responsibility of the school. Candidates receiving federal aid are selected by the state health officers. Some state health officers have had difficulty in obtaining suitable staff members and have found it necessary for many years to do the best they could with any who were interested. With the advent of federal training for public health personnel and the increase of economic problems in the private practice of medicine, together with the tendency of modern youth to think more collectively, many young men of fine character and ability are now available. There seems no need longer to select any but the best.

2. The health officers' training must, of course, be technically complete and intensive. However, few health officers fail because of lack of professional knowledge. In fact, the well entrenched health officer can get along with surprisingly little technical knowledge. Few health officers can get along without considerable knowledge of statesmanship, political science, psychology, personnel management, and business administration. This knowledge will be better organized and more useful if more provision is made for gaining it

in the curriculum rather than leaving it to hit-or-miss observation. For instance, a frank study of politics "as is," together with consideration of the theories of government, will help fortify the health officer against disillusionment and to maintain his balance. These need not be long courses, but should be specially prepared for health officer needs.

3. It is surprising how little we really know about the job of being a health officer. Would it not be worth while to make a careful job analysis of several health officers' work such as is done with important positions in many industries? Having determined precisely what the average health officer does, how much time he spends on each of his known professional functions, how much time and in what manner he spends that time on his administrative duties, what his major problems are during the course of a year, we may then be in a better position to teach what he needs to know. If we might add to this a careful study of health officer success and failure, analyzing the causes underlying each, we might then keep our curriculum an active, vital factor in helping graduates to meet life situations.

4. Is it altogether necessary to surround the granting of a degree with pomp and circumstance? May it not be that graduate students, like elementary pupils, will show varying speeds of learning? May not some be ready for the degree in 9 months, while others may need 18? The completion of certain units with a certain grade on examination may shed little light on actual achievement and ability. Some may need more experience and less classwork, others more of both. Could not the degree be granted without ceremony at any time when the faculty and the state health officer are satisfied with the student's achievement?

5. An understanding of modern health education methods is one of the

most urgent needs of all health officers. Since the transition of public health from the legislative to the educational era, education has become one of the most important functions of the health department. It will remain an important function long after most of the contagious diseases and sanitary problems are conquered.

The science and art of education have advanced so rapidly that public health schools have failed to keep pace with modern methods. Today's health officer should be better equipped than anyone else in his community to help organize adult health education. He should be prepared to confer with teachers in their own language and to provide means of coöperating with the school health education program. If we bear in mind that the purpose of health education is to improve health behavior, and if we measure results to date in terms of that improvement, we shall be shocked with the extent of our failure. Considerable time should be devoted, therefore, to teaching our trainees modern educational methods.

6. One way for the trainee to learn and benefit from modern educational methods is to be subjected to them himself. For this, the graduate course in public health offers unique opportunities. We deal with men and women who have undergone rigorous and prolonged schooling. They are the survivors of a careful system of selection and elimination. They are, therefore, comparatively well educated. They have trained minds. They are intelligent. They have an unusual degree of motivation. We may assume that they are a select product of our educational system. We need not be concerned with the century-old educational conflict between cultural and professional elements. These students come to us for graduate professional training, for specialization.

This is the place for us to recognize

that "a coherent structure of thought and an integrated pattern of behavior are necessary to give meaning to specific facts and skills."⁷ This is the place for us to build a curriculum which will meet the ultimate test of true knowledge. Is this knowledge useful in life situations? We must provide actual experience outside the classroom in order to stimulate students to use books and laboratories intelligently. Such experience must be suited to each individual's needs and based upon the relative fertility or sterility of his previous training. We must measure progress by actual achievement rather than by grades and units. We must recognize that the only curriculum which is educative in the long-run is that which provides for a large measure of self-education. We must ask ourselves: "Do our graduates come out with a vision of what society might be, tempered by an understanding of things as they are, and implemented by a commitment to some specific undertaking wherein each can effectively take hold?"⁸ Only when this question can be answered in the affirmative will our academic degree carry some of the guarantee of measured competence to which Dr. Gregg referred. Whether that degree, then, is a C.P.H. or an X.Y.Z. will matter little to the school, the recipient, or the public.

REFERENCES

1. Terman, Lewis M., Professor of Psychology and Education, Stanford University. Personal Communication.
2. See "Politics," Webster's New International Dictionary, Second Edition, Unabridged, 1935.
3. Leonard, John Paul, Associate Professor of Education, Stanford University. Personal Communication.
4. Biddle, W. W. A Psychological Definition of Propaganda. *J. Abnorm. & Social Psychol.*, 26, 3:283 (Oct.-Dec.), 1931.
5. Shepard, W. P. Recent Progress in Health Education. *A.J.P.H.*, 27, 5:454-463 (May), 1937.
6. *Yearbook, American Public Health Association, 1937-1938*, p. 11, past-presidents of the A.P.H.A. who were health officers.
7. Limbert, Paul M. Trends and Patterns in the Changing College Curriculum. *Teachers College Record*, Columbia University, 40, 8:669 (May), 1939.
8. *Ibid.*, p. 684.

Development of Tuberculosis in Infected Children*

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IN laboratory animals where time of infection and dose of bacilli can be controlled there is substantial agreement that primary infection with tuberculosis, if not overwhelming, results in a measurably increased resistance to subsequent inoculations with tubercle bacilli.^{1, 2, 3} In man the picture is less clear. Although the typical parenchymal infiltration of primary infection, followed by resolution, fibrosis and calcification, is not infrequently observed roentgenologically, the exact date of reinfection and the duration of exposure are rarely known, and the dosage of bacilli is wholly problematical. Furthermore, it has not been demonstrated how far the results of inoculation experiments with tuberculosis in laboratory animals can be applied to natural infection in man.

From a public health standpoint the relationship between primary infection with tuberculosis and the development of subsequent progressive disease has become a problem of major importance. Is a primary infection acquired during childhood a relative safeguard against subsequent exposure? or does the sensitization acquired through such infection result in increased susceptibility to destructive lesions?

Much evidence might be cited to

support both opinions, and the epidemiological findings so far reported appear to be contradictory.⁴⁻⁹ Obviously the answer is not simple and the diversity of opinions based on extensive studies at least suggests that the end results may be strongly conditioned by such variables as the type of population exposed, the level of tuberculous infection in the community, and various environmental factors. Such complications make it difficult to compare directly the findings of different investigators, but for practical purposes the amount of tuberculous disease which in sufficient periods of time develops in properly controlled population groups appears to be the best measure of the significance of childhood infection in the evolution of phthisis.

In connection with its field clinic work on tuberculosis in school children, the Massachusetts Department of Public Health has during the past 15 years attempted to collect evidence on the relationship of childhood infection to the subsequent development of progressive tuberculosis in adolescents and young adults. On account of the long, indeterminate incubation period of tuberculosis and the slow development of clinical disease, it has been necessary to employ epidemiological methods which would give a perpendicular rather than the usual horizontal picture of the situation. The main object has been to obtain a quantitative measurement of

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the amount of progressive tuberculous disease subsequently developing in large groups of children examined in the clinics, classified according to age and sex, the initial reaction to the tuberculin test, roentgenological evidence of tuberculous disease, and known household contact with tuberculosis.

The basic material to be presented consists of the data on some 400,000 school children tuberculin tested in the Chadwick Clinics between 1924 and 1934, the reëxamination of certain groups of these children, and the cases of pulmonary tuberculosis subsequently reported in the entire group. During the first 3 years of the clinic children were selected for examination on the basis of known exposure to tuberculosis, under-

weight of 10 per cent or more, definite or suspicious symptoms or signs of pulmonary disease. For the next 2 years all school children for whom consents were received were examined, irrespective of special indications. During these 5 years complete physical examinations were made on all children examined, in addition to the von Pirquet test and roentgenogram of the chest of all positive reactors. During the last 5 years examination was limited to the tuberculin test of all children, with X-ray of reactors and physical examination only for children with positive roentgenograms. All children with roentgenological signs of either childhood or adult type tuberculosis were reëxamined annually with X-ray of the chest, and

TABLE 1

Reported Cases and Deaths from Tuberculosis in Children Previously Tested in Clinics, Excluding Those Who Had Tuberculosis When First Tested

	Number Originally Tested 1924-1934	Cases Subsequently Reported 1924-1936	Deaths from Tuberculosis 1924-1936	Total Known Tuberculosis
All tested	400,330	319	100	419
Reactors	99,769	189	52	241
Non-reactors	300,561	130	48	178

TABLE 2

Rates per 100,000 Children Tested

	Living Case Rate	Death Rate	Rate for All Cases	Case Fatality Rate, Per cent
All tested	79.7± 4.5	25.0±2.5	104.7± 5.1	23.9
Reactors	189.4±13.8	52.1±7.2	241.6±15.6	21.6
Non-reactors	43.2± 3.8	16.0±2.3	59.2± 4.4	27.0
R+				
R-	4.4	3.2	4.1	

TABLE 3

Distribution of Deaths from Tuberculosis

	Total	Non-reactors	Reactors
Median interval between test and death in years	5.7	5.9	5.6
Deaths 1- 3 years after test	18	8	10
" 4- 6 " " "	36	21	15
" 7- 9 " " "	34	16	18
" 10-12 " " "	11	6	5
Males	27	14	13
Females	73	39	34

whenever possible followed to the end of their school life.

The problem has been approached from several angles and the data are presented in the form of two series of observations:

1. Reported subsequent morbidity and mortality from tuberculosis in the entire group of children tested
2. The development of tuberculosis in children under annual observation of the clinic

FIRST SERIES

Soon after the beginning of the Ten Year Program an alphabetical-geographical card index was set up for all children examined in the clinics, making it possible to check any subsequent developments against a child's status at the time of first examination. By means of this index all cases and deaths from pulmonary tuberculosis reported in Massachusetts from 1924 to 1936, inclusive, in the age groups covered by the Ten Year Program were checked to determine whether the individuals in question had ever been examined in our clinics. The diagnosis of tuberculosis in each report or death certificate was confirmed before it was included in the study. Thus a list was established of verified cases and deaths from tuberculosis which had developed in a period of 13 years in a group of some 400,000 children. The morbidity and mortality in this group up to 1934 have been reported previously by one of us.¹⁰ It is probable that the reporting of cases is somewhat more complete in the group of reactors followed in the clinic than in the general population, but there is certainly no such weighting of the deaths reported. The cases and deaths from tuberculosis, together with morbidity and mortality rates, according to the tuberculin reaction on first examination are shown in Tables 1, 2 and 3.

In spite of the significantly higher morbidity and mortality among the children who reacted to the initial

tuberculin test, the case fatality rate has been slightly higher among cases in children originally tuberculin negative. This would appear to cast some doubt on the benign character of first infections acquired between the ages 6 and 16. It will be noticed that the median interval between the tuberculin test and death in fatal cases is essentially the same among the originally negative and originally positive reactors.

SECOND SERIES

Of the children tested, X-rayed, and examined in the school clinics, a large number were, for reasons given above, kept under annual observation with X-rays and physical examinations. For statistical analysis all those were selected who did not have pulmonary tuberculosis or non-tuberculous pulmonary disease on first examination and who were reexamined by X-ray at least once, a year or more subsequently. A total of 19,346 satisfied these requirements. Their mean age at the beginning of the period of observation was 11.4 years, and the mean period of observation was 3.4 years, with a maximum of 11 to 12 and a minimum of 1 to 2 years.

While these observations are based on a large experience, they have certain limitations which should be pointed out. The von Pirquet test was used throughout the study; however, specially trained physicians made both the tests and the interpretations, and multiple tests were often performed. Cases were classified as "contact" when a history of exposure to tuberculosis at any time since birth was obtained from either the parents or health department, and it was usually not possible to verify this by examination of the supposed contact or to find previously unsuspected sources of infection. In the majority of cases listed as contacts, contact had been broken when the child came under observation. A positive contact history was obtained in 33.9 per cent of the

TABLE 4
Cumulative Morbidity
Whole Group

Years of Observation	Number at Beginning I_x	Number Withdrawn During Year w_x	Number Developing Tuberculosis d_x	Average Number Under Observation During Year $I_x - \frac{w_x}{2}$	Per cent Developing Tuberculosis During Year $\frac{d_x}{100I_x}$	$100p_x$	$100P_x$	Per cent Cumulative Morbidity $100(I-P)_x$
1-2	19,346	3,060	21	17,816	0.118	99.882	99.88	0.12
2-3	16,265	4,262	33	14,134	0.233	99.767	99.65	0.35
3-4	11,970	3,937	28	10,001	0.280	99.720	99.37	0.63
4-5	8,005	3,249	23	6,380	0.361	99.639	99.01	0.99
5-6	4,733	2,025	21	3,720	0.564	99.436	98.45	1.55
6-7	2,687	1,286	15	2,044	0.734	99.266	97.73	2.27
7-8	1,386	655	10	1,058	0.945	99.055	96.81	3.19
8-9	721	367	7	537	1.303	98.697	95.55	4.45
9-10	347	202	2	246	0.813	99.187	94.77	5.23
10-11	143	91	1	97	1.031	98.969	93.79	6.21
11-12	51	49	2	26	7.692	92.308	86.58	13.42

TABLE 5

Cumulative Morbidity Rates from Tuberculosis Among School Children According to Sex, Tuberculin Reaction and Roentgenological Findings at First Examination

Years of Observation	Total	Males	Females	Negative von Pirquet *	Positive von Pirquet	Positive von Pirquet Negative X-ray	Positive von Pirquet Positive X-ray
1-2 Years	0.12	0.11	0.12	...	0.13	0.04	0.23
2-3 "	0.35	0.22	0.46	...	0.38	0.10	0.68
3-4 "	0.63	0.40	0.82	...	0.68	0.16	1.21
4-5 "	0.99	0.58	1.32	...	1.05	0.30	1.80
5-6 "	1.55	0.82	2.13	...	1.63	0.74	2.49
6-7 "	2.27	1.14	3.18	...	2.38	0.86	3.67
7-8 "	3.19	1.72	4.41	2.4	3.24	0.86	5.09
8-9 "	4.45	3.19	5.47	2.4	4.55	1.36	6.89
9-10 "	5.23	4.02	6.21	2.4	5.36	2.44	7.54
10-11 "	6.21	4.02	8.12	2.4	6.40	2.44	9.08
Mean age of group at beginning of observation	11.43	11.51	11.38	10.38	11.52	11.43	11.65
Mean period of observation	3.4	3.3	3.4	2.8	3.5	3.4	3.6

* Only one breakdown occurred in this group.

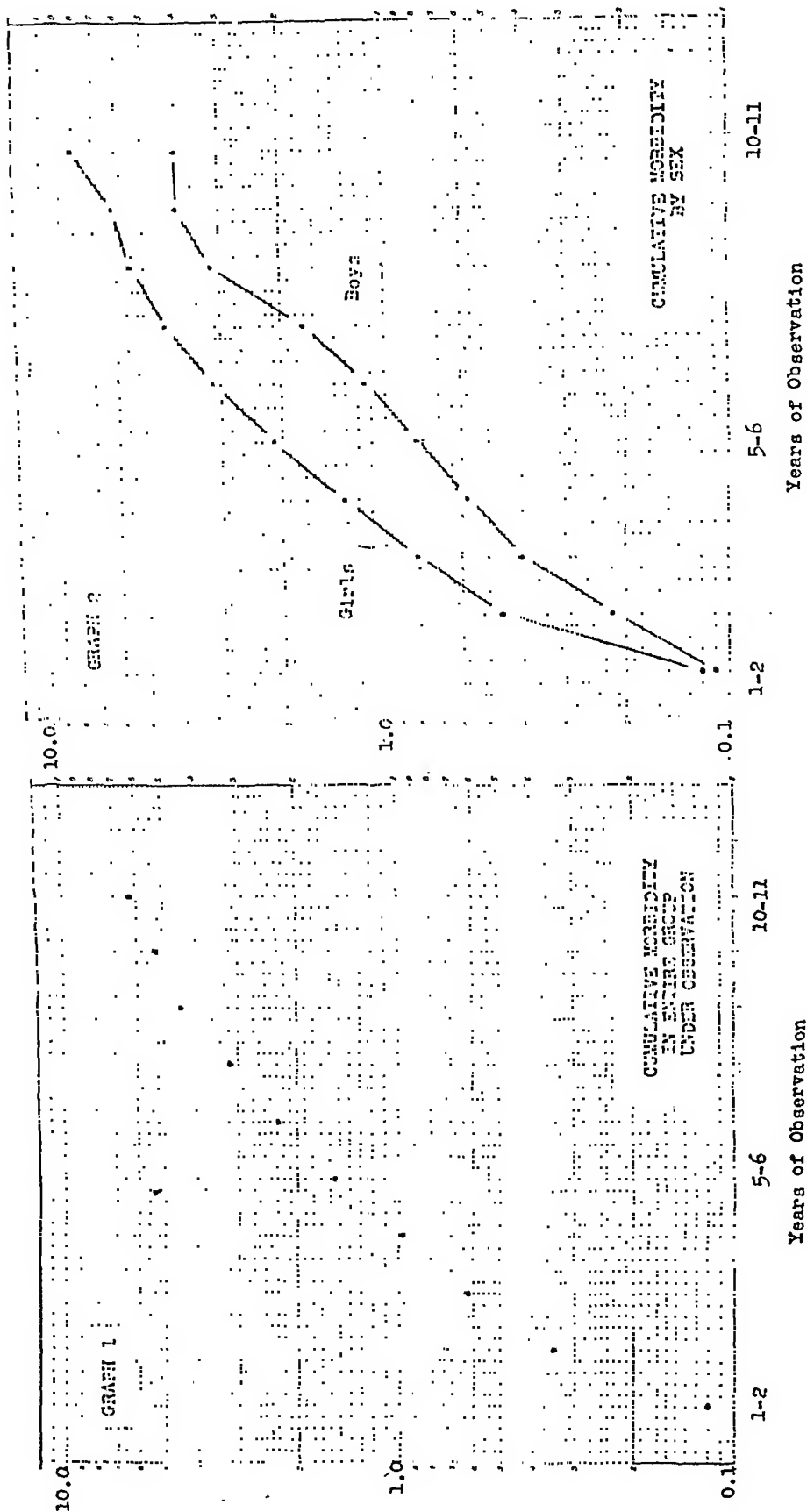
TABLE 6

Cumulative Morbidity After 7-8 Years According to History of Exposure

	Contacts		Non-contacts		Combined	
	Number Developing Tuberculosis ¹	Per cent Morbidity	Number	Per cent	Number	Per cent
All cases	106	5.1	45	1.8	151	3.2
Males	23	2.4	16	0.48	39	1.7
Females	83	7.5	29	2.31	112	4.4
Original non-reactors	1	5.0	..	....	1	2.4
Original reactors	105	5.3	45	1.9	150	3.2
With negative X-ray	15	1.5	7	0.6	22	0.9
With positive X-ray ²	90	7.7	38	3.0	128	5.1

1. This applies to all cases developing pulmonary or extrapulmonary tuberculosis during study, and includes those who have subsequently died.

2. "Positive X-ray" here refers to those who when first tested and examined showed old childhood-type lesions in parenchyma, hilum, or both locations. These were generally calcified, and might be single or multiple.



cases of childhood type tuberculosis, in 27.4 per cent of the reactors with negative X-ray, and in 67.7 per cent of the non-reactors in this series; the high figure for non-reactors means of course that the usual reason for keeping them under observation was a contact history.

Two methods of analysis were applied to determine the frequency of breakdown from tuberculosis. The first, or cumulative morbidity method, was suggested by Frost and used by Brailey¹¹; a description of the mathematics involved is given by Puffer, Stewart, and Gass.¹² Table 4 illustrates its application to the entire series; Table 5 shows the cumulative morbidity as derived in the last column of Table 4, by years for each group. While some children were followed for 11-12 years, the figures for

the last few years are unduly influenced by a single breakdown, since the number remaining under observation is small; therefore in Table 6, which divides the groups according to contact, the morbidity is taken only at the end of 7-8 years of observation. Since no differences were noted in the distribution of cases of pulmonary tuberculosis and of other reinfection forms of the disease, all are included together in the tables. There was a total of 142 pulmonary cases, 8 pleural effusions, and 13 extra-pulmonary cases; 31 deaths from tuberculosis occurred during the study.

As this method takes into account years of observation but not age, it was felt that another approach based on age might further illuminate the problem. The method adopted is one used by Herlitz⁶ and is illustrated in Table 7.

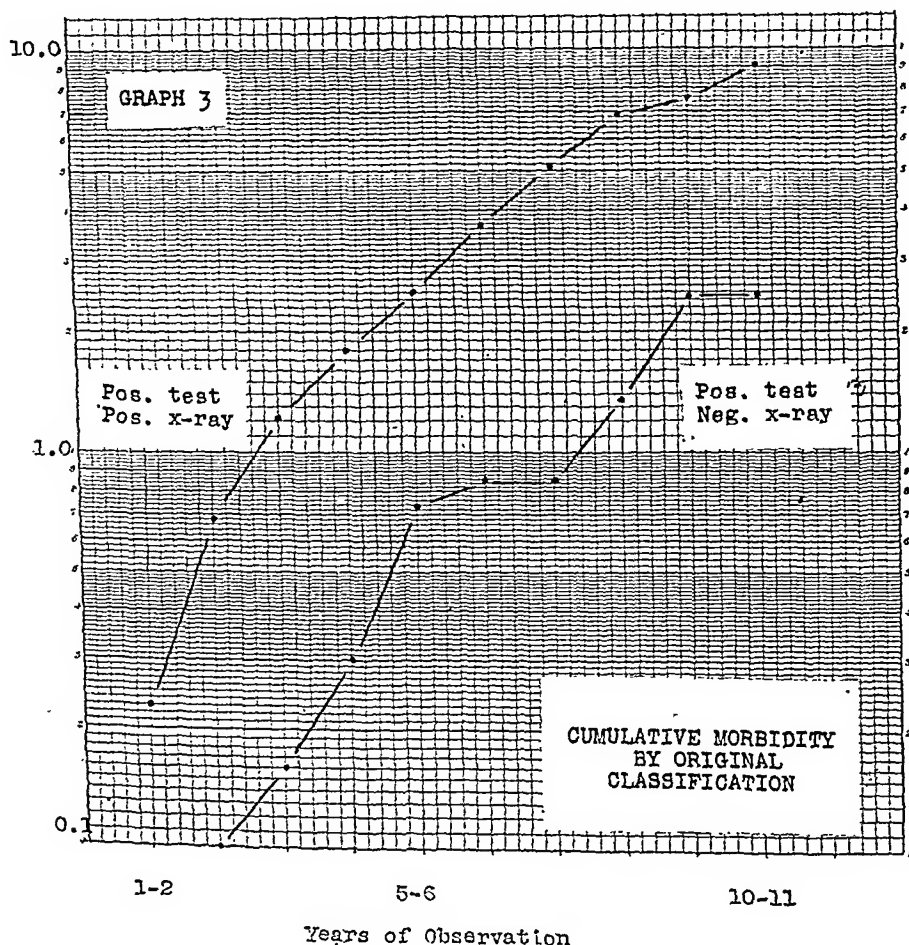


TABLE 7

Age-specific Morbidity from Tuberculosis in Reacting and Non-reacting Children

Age	GROUP I Original Reactors		GROUP II Original Non-reactors		Expected Cases Among Non-reactors
	Number Under Observation	Number Developing Tuberculosis	Number Under Observation	Number Developing Tuberculosis	
6	90	0	26	0	0.0
7	556	2	117	0	0.4
8	1,470	0	287	0	0.0
9	2,603	0	390	0	0.0
10	3,968	6	454	0	0.7
11	5,288	10	478	0	0.9
12	6,616	8	503	0	0.6
13	7,806	14	519	0	0.9
14	8,464	22	466	0	1.2
15	8,245	24	409	0	1.2
16	6,754	27	298	0	1.2
17	4,632	18	202	0	0.8
18	2,601	10	221	0	0.8
19	1,324	12	47	1	0.5
Total		153±12.4		1±1	9.2±0.7
Difference=8.2±1.2					

TABLE 8

Observed and Expected Cases of Tuberculosis (All Forms) Developing Subsequent to Initial Examination According to Sex, Tuberculin Reaction, X-ray Findings and Contact Age 6-19

	Contact Group	Non-contact Group	Combined Group
Total number of cases developing tuberculosis	111	43	154
Number of males developing tuberculosis	26	16	42
Number of males expected to develop tuberculosis based on female morbidity rates	77.7	21.8	95.4
Difference	51.7±9.8	5.8±5.8	53.4±11.4
Number of cases of tuberculosis observed among non-reactors	1	0	1
Cases expected based on morbidity rates of original reactors	12.0	1.7	9.2
Difference	11.0±1.6		8.2±1.2
Cases observed among original reactors with negative X-ray	18	7	25
Cases expected based on morbidity rates of reactors with positive X-ray	72.9	39.9	123
Difference	55.4±8.8	32.9±7.2	98±12
Cases observed in non-contact group			43
Cases expected in whole non-contact group based on morbidity rates of contacts			212.3
Difference			169.3±21.1

The number of children under observation at each age is obtained by counting each child as many times as he is years under observation; e.g., if a child was followed from 8 to 10, he is included in the totals for ages 8, 9, and 10. The observations were carried only to age 19 although a few persons had been followed into adult life. The expected number of breakdowns at each age in a group of known size can be computed from the age specific morbidity rates of the group with which it is being compared, and its difference from the actual

observed number of breakdowns noted. Table 8 presents a comparison of the major groupings by this method, and Table 9 gives the morbidity rate by ages.

It will be seen by reference to Tables 4 to 9 that the incidence of tuberculosis remains at a low level up to about the age of 10, after which it rises steadily, and much more rapidly in girls than in boys. It is this lag between infection and the development of active disease which makes the relationship so difficult to appraise. Many children are

TABLE 9

Morbidity by Age			
Age	Number Under Observation	Number Developing Tuberculosis	Per cent Morbidity
6	116	..	...
7	673	2	0.3
8	1,757	..	...
9	2,993	..	...
10	4,422	6	0.1
11	5,766	10	0.2
12	7,119	8	0.1
13	8,325	14	0.2
14	8,930	22	0.2
15	8,654	24	0.3
16	7,052	27	0.4
17	4,834	18	0.4
18	2,822	10	0.4
19	1,371	13	0.9

lost from observation before they reach an age at which they are likely to develop tuberculosis, and among those who are followed it is often impossible to determine with any certainty the time and degree of any subsequent exposure. All of our evidence indicates that in school children it is the age of the individual rather than the time of exposure or any environmental factor which determines the time at which tuberculosis develops. It will also be noted that the incidence of tuberculosis is higher among original reactors to the tuberculin test than among non-reactors, and significantly higher among those whose original X-rays showed evidence of childhood type tuberculosis than among reactors with negative films; and that it is higher in each group among contacts than non-contacts.

SUMMARY AND CONCLUSIONS

In a group of some 400,000 Massachusetts school children tuberculin tested in the period 1924-1934 the subsequent reported morbidity and mortality from tuberculosis has been determined to the end of 1936, and rates have been computed on the basis of the original reaction.

Among the reactors the morbidity from adult type tuberculosis has been approximately 4 times that in the non-reactors. The death rate has been 3 times as great in the reactors, and the

case fatality essentially the same in the two groups.

The cumulative morbidity from tuberculosis in children reexamined annually for 10-11 years was over 6 per cent. This rate was approximately twice as high in females as in males, was substantially higher among reactors than among non-reactors and among reactors was over 3 times as high in those with originally positive roentgenograms.

For this second series the tuberculosis morbidity among children with a history of family exposure to the disease was $2\frac{1}{2}$ times that in children without known exposure.

Age specific morbidity rates in the series show that significant tuberculosis in school children is infrequent below the age of 10, that the incidence rises rapidly after this age, and much more rapidly in girls than in boys.

REFERENCES

1. Lurie, M. B. Experimental Epidemiology of Tuberculosis. *J. Exper. Med.*, 58:305 (Sept.), 1933.
2. Opie, E. L., and Freund, J. An Experimental Study of Protective Inoculation with Heat Killed Tubercle Bacilli. *J. Exper. Med.*, 66:761 (Dec.), 1937.
3. Clawson, B. J. Experiments Relative to Vaccination Against Tuberculosis with BCG. *Arch. Path.*, 20:343 (Sept.), 1935.
4. Opie, E. L. Present Concepts of Tuberculous Infection and Disease. *Am. Rev. Tuberc.*, 32:617 (Dec.), 1935.
5. Wallgren, A. Pulmonary Tuberculosis; Relation of Childhood Infection to Disease in Adults. *Lancet*, 1:417 (Feb. 19), 1938.
6. Herlitz, G. Studien über die Prognose der okkulten Kindertuberculose. *Acta paediat. (supp. 2)*, 19:1-157, 1937.
7. Ustvedt, J. H. Frequency of Tuberculous Disease Among the Recently Infected. *Nord. med. tidskr.*, V, 4:956, 1932.
8. Myers, J. A., and Harrington, F. E. Effect of Initial Tuberculous Infection on Subsequent Tuberculous Lesions. *J.A.M.A.*, 103:1530 (Nov. 17), 1934.
9. Jacobs, A. L. Investigations Upon Tuberculosis Among Students in Scandinavia. *Tubercle*, 19:481 (Aug.), 1938.
10. Pope, A. S. Application of Our Knowledge of Tuberculosis Through Case Finding. *Tr. Nat. Tuberc. Assoc.*, 31:317, 1935.
11. Brailley, M. Mortality in Tuberculin-Positive Infants. *Bull. Johns Hopkins Hosp.*, 59:1 (July), 1936.
12. Puffer, R. R., Stewart, H. C., and Gass, R. S. Tuberculosis Studies in Tennessee. *Am. J. Hyg.*, 28:490 (Nov.), 1938.

NOTE: Our indebtedness is acknowledged to the International Health Division of the Rockefeller Foundation whose support made possible the collection of part of these data.

Food Poisoning Due to Staphylococci

With Special Reference to Staphylococcus Agglutination by Normal Horse Serum*

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SINCE 1930, when Cary, Dack, Woolpert, and Wiggers¹ demonstrated that staphylococci are capable of causing food poisoning, many outbreaks have been recorded in the literature in which these organisms have been incriminated. There is little doubt that staphylococci are the most frequent causes of food poisoning in the United States at the present time. A survey of the literature on staphylococcus food poisoning indicates that bakery products, particularly those containing a cream or custard filling, have most frequently been involved in this type of food poisoning, although various other food products, such as milk,^{2, 3, 4} gravy,⁵ cheese,⁶ and meat,⁷ have been occasionally incriminated.

It is the purpose of this paper to point out another type of food product which, in the experience of the authors and their associates, is involved so frequently in staphylococcus food poisoning as to warrant particular attention. Dur-

ing the past 4 years and particularly during the past 2 years the Division of Bacteriology of the Food and Drug Administration, U. S. Department of Agriculture, has been called upon to conduct laboratory examinations of specimens of the so-called "ready to eat" hams which were collected in connection with food poisoning outbreaks. In every instance in which the epidemiological evidence definitely implicated ham as the food involved in the outbreak, laboratory investigation has revealed the presence of large numbers of staphylococci, which were demonstrated to be food-poisoning types, either by feeding sterile culture filtrates to young cats or by the intraperitoneal injection of boiled filtrates into kittens or young cats as described by Dolman, Wilson, and Cockcroft,⁸ and Dolman and Wilson.⁹

Up to the present time 10 such outbreaks have been studied, 8 of which have occurred during the past 2 years, and 5 of these during the past summer. In addition to the above outbreaks in which laboratory investigations were conducted, we have in our files reports on 8 additional outbreaks in which, although samples were not available for examination, the epidemiological evidence, symptomatology, incubation pe-

* Read at a Joint Session of the Food and Nutrition and Laboratory Sections of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 18, 1939.

The data pertaining to the studies on food poisoning staphylococci are taken from a thesis presented by Glenn G. Slocum, in June, 1939, to the faculty of the Graduate School of the University of Maryland, in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

riod, and other information leave little doubt that they were caused by staphylococci.

Two further outbreaks were investigated which are of interest in that they followed the consumption of beef tongue, a salt-cured meat product. One of these outbreaks was investigated and reported by Dack, Bowman, and Harger.⁷

In all, these 20 outbreaks in which ham and beef tongue were implicated, affected at least 1,028 individuals. Two deaths occurred among these victims, neither of which was attributed directly to food poisoning, but rather to other complicating conditions.

In many of the outbreaks studied in this series there is little evidence to indicate the source of the staphylococci or when, in the process of manufacture, distribution, and handling prior to consumption, the organisms gained entrance into the products. In many instances there appears little doubt that the formation of enterotoxin, and perhaps even the contamination of the meat, resulted from improper handling in the hands of the consumer. In other outbreaks the evidence suggests that contamination occurred prior to the time the meat reached the ultimate consumer. The problem does not appear to be peculiar to any particular manufacturing plants, but rather to the type of products involved.

Although the literature does not contain many references dealing with staphylococcus food poisoning in which ham or related salt-cured meat products have been involved, we have reason to believe that such products are quite commonly the cause of food poisoning but have failed to receive publicity or attention. Stone¹⁰ has reported 7 outbreaks caused by consumption of "baked" ham or related salt-cured meat products in which he has demonstrated enterotoxic staphylococci as the probable cause. Personal conversations or communications with various public

health workers have revealed that it is not uncommon to encounter such outbreaks frequently during the summer months.

Kelly and Dack¹¹ conducted a study to discover whether staphylococci would grow and produce enterotoxin in meat sandwiches as a result of the outbreak reported by Dack, Bowman, and Harger⁷ in which pickled beef tongue sandwiches were involved. They noted that staphylococci were the predominating contaminants in salt-cured ham and tongue and demonstrated that staphylococci would grow in such products in which the salt concentration was sufficient to prevent the growth of bacilli. They further demonstrated that staphylococci would develop in sandwiches and produce enterotoxin therein. Therefore, it appears that ham is a favorable medium for growth and production of toxin by these organisms.

In the course of laboratory investigations of the above mentioned outbreaks, as well as others in which a variety of food products were implicated, we have been constantly impressed, as have other workers in this field, with the need for more simple and rapid laboratory procedures for the identification of food-poisoning staphylococci.

Recognition of this need led to the study by the senior author of a series of 37 cultures isolated from specimens of ham and other food products involved in 11 outbreaks of food poisoning. All but 2 of the 37 cultures were considered enterotoxic strains at the time of isolation, as indicated by toxicity tests, but in 2 instances evidence of toxicity was based only on the bacteriological and epidemiological investigations. A study of the ability of these strains to produce enterotoxin revealed that during storage on laboratory media the great majority of the strains had lost this characteristic. It also appeared that storage had diminished the ability of the majority of the strains to liquefy gelatin actively,

that is, to produce a positive Stone reaction on Bacto Stone's extract gelatin agar. Only 3 strains produced definite positive Stone reactions, and of these, only 2 produced enterotoxin, as determined by the technic described by Dolman and Wilson.⁹ Three strains isolated from a specimen of ham during the course of this investigation, while capable of producing enterotoxin, did not produce a positive Stone reaction. On the basis of these two properties the strains in this collection could be divided into 4 types. Thirty-one strains were enterotoxin negative, Stone negative; 1 strain enterotoxin negative, Stone positive; 2 strains enterotoxin positive, Stone positive; and the 3 recently isolated strains were enterotoxin positive, Stone negative. This would seem to confirm the observations of other investigators that gelatin liquefaction on the Stone medium is not a reliable index of the ability of the strains to produce enterotoxin.

Other attempts were made to differentiate the enterotoxic from the non-enterotoxic strains with results which appeared to be of some significance. The enterotoxic strains were found to produce as much, and in the case of the Stone positive strains, more, hemolysin for rabbit erythrocytes than did any of the non-enterotoxic strains. All of the enterotoxic strains produced a small amount of hemolysin for human erythrocytes, while none of the non-enterotoxic strains produced any appreciable amount of this hemolysin.

A study of the behavior of these strains of staphylococci in the presence of normal horse serum was prompted by the observations of Beumer,¹² who showed that while the addition of normal horse serum to broth prevented the production of hemolysin by most pathogenic staphylococci, certain strains were capable of producing hemolysin in its presence. He presented evidence that the ability of these strains to pro-

duce hemolysin in the presence of horse serum was caused by the destruction of the normal antilysins by the proteolytic breakdown of the serum proteins by these strains. Since the evidence presented by Stone¹³ and other investigators indicates that enterotoxic staphylococci are more active in their ability to liquefy gelatin than non-enterotoxic types, it appeared possible that they might also be more actively proteolytic on horse serum. However, when the strains in this collection were grown on coagulated horse serum, and on coagulated horse serum containing 3 per cent Difco beef extract, their proteolytic activity exactly paralleled their activity on Bacto Stone's extract gelatin agar. When grown in broth containing 20 per cent horse serum the enterotoxic Stone positive strains were found to be capable of producing hemolysin for rabbit erythrocytes. None of the non-enterotoxic strains, including the one strain which gave a positive Stone reaction and was proteolytic on coagulated horse serum, was capable of producing this hemolysin in broth containing horse serum. However, the recently isolated enterotoxic Stone negative strains would produce hemolysin only when grown in a partial atmosphere of carbon dioxide, but when grown under such conditions, produced much greater quantities of hemolysin for rabbit erythrocytes in the presence of horse serum than in its absence. Since other strains in the collection produced hemolysin in the presence of horse serum when grown in a partial atmosphere of carbon dioxide, the value of this method appeared limited for all practical purposes.

Finally, these strains were studied in their relation to the normal agglutinins in horse serum. These studies revealed a marked difference between the enterotoxic and non-enterotoxic strains in this collection in their agglutinability by normal horse serum. When living suspensions of the staphylococci were

mixed with varying dilutions of normal horse serum and incubated at 37°C. for 24 hours, selected non-enterotoxigenic strains were completely agglutinated in serum dilutions of 1:160 or 1:320, with the formation of large aggregates or clumps. Under the same conditions the enterotoxigenic strains were only partially agglutinated in serum dilutions of 1:80 and 1:160, and this agglutination was of the finely granular type. In the lower serum dilutions the enterotoxigenic strains showed marked growth with production of a heavy, diffuse turbidity. This suggested that the serum agglutinins had been destroyed during growth of the enterotoxigenic strains but since one of these strains had previously been demonstrated to be devoid of proteolytic activity on coagulated horse serum, and since the non-enterotoxigenic strains were completely agglutinated in comparatively high serum dilutions, it would appear that the difference in agglutinability was caused by some other inherent characteristics of the strains. In order to minimize the factor of growth, other tests were conducted in which incubation was carried out at 37°C. for 3 hours, followed by storage at 7°C. over night. Under these conditions, the enterotoxigenic strains failed to agglutinate while the non-enterotoxigenic strains were completely agglutinated in 1:10 serum dilutions, and almost completely in a dilution of 1:20.

With a full realization of the limitations imposed upon any interpretation of the above results, since only one horse serum and a few staphylococcus strains were studied, the results strongly suggest the probability that a fundamental difference exists between enterotoxigenic and non-enterotoxigenic strains of staphylococci in their agglutinability by normal horse serum. Further investigations have been started with other horse sera and known enterotoxigenic and non-enterotoxigenic strains of staphylococci, in order to determine whether this agglu-

tion phenomenon is sufficiently characteristic to be of differential value.

SUMMARY

1. The occurrence of 20 outbreaks of food poisoning apparently due to staphylococci, all of which followed the consumption of "ready to eat" hams or tongue, is discussed. The public health problem presented by the incidence of staphylococcus food poisoning, involving "ready to eat" ham and related salt-cured meat products, appears to be as great as that presented by custard-filled bakery products.

2. A study of 37 strains of staphylococci isolated from food involved in 11 outbreaks of food poisoning demonstrated that the great majority of the strains had lost their ability to produce enterotoxin and to produce a positive Stone reaction during storage on laboratory media.

3. A fundamental difference between the enterotoxigenic and non-enterotoxigenic strains studied, seems to be indicated by the fact that they differ markedly in agglutinability by normal horse serum.

ACKNOWLEDGMENTS — Acknowledgment is made to the Food and Drug Administration of the U. S. Department of Agriculture for permission to present the data given in this paper and to Dr. A. C. Hunter, under whose direction this work was carried out.

REFERENCES

1. Dack, G. M., Cary, W. E., Woolpert, Oram, and Wiggers, Hazel. An Outbreak of Food Poisoning Proved to Be Due to a Yellow Hemolytic Staphylococcus. *J. Prev. Med.*, 4:167 (Mar.), 1930.
2. Ramsey, R. J., and Tracy, P. H. Food Poisoning Probably Caused by Orange Colored Staphylococcus from Udder of Apparently Healthy Cows. *Proc. Soc. Exper. Biol. & Med.*, 28:390 (Jan.), 1931.
3. Crabtree, James A., and Litterer, William. Outbreak of Milk Poisoning Due to a Toxin-Producing Staphylococcus Found in the Udders of Two Cows. *A.J.P.H.*, 24:1116 (Nov.), 1934.
4. Shaughnessy, H. J., and Grubb, T. C. Staphylococcus Food Poisoning. *J. Infect. Dis.*, 58:318 (May-June), 1936.
5. Jordan, E. O., and Hall, J. R. A Case of Food Poisoning Apparently Due to Staphylococcus. *J. Prev. Med.*, 5:387 (Sept.), 1931.
6. Jordan, E. O. The Production by Staphylococci of a Substance Causing Food Poisoning. *J.A.M.A.*, 94:1648 (May 24), 1930.
7. Dack, G. M., Bowman, G. W., and Harger, R. N. An Outbreak of Food Poisoning Apparently

Due to Staphylococci. *J.A.M.A.*, 105:1598 (Nov. 16), 1935.

8. Dolman, C. E., Wilson, R. J., and Cockcroft, W. H. A New Method of Detecting Staphylococcus Enterotoxin. *Canad. Pub. Health J.*, 27:489 (Oct.), 1936.

9. Dolman, C. E., and Wilson, R. J. Experiments with Staphylococcal Enterotoxin. *J. Immunol.*, 35:13 (July), 1938.

10. Stone, R. V. Staphylococcus Studies. Bureau Laboratories Los Angeles County Health Dept., *Annual Report 1937-1938*, p. 46.

11. Kelly, Florene C., and Dack, G. M. Experimental Staphylococcus Food Poisoning. A Study of the Growth of a Food Poisoning Staphylococcus and the Production of an Enterotoxic Substance in Bread and Meat. *A.J.P.H.*, 26:1077 (Nov.), 1936.

12. Beumer, J. L'Action du Sérum de Cheval Normal sur la Staphylotoxine. *Ann. Inst. Pasteur*, 61:54 (July), 1938.

13. Stone, R. V. A Cultural Method for Classifying Staphylococci as of the "Food Poisoning" Type. *Proc. Soc. Exper. Biol. & Med.*, 33:185 (Oct.), 1935.

Cost of the World War*

IN money the World War cost \$337,-846,000,000, of which \$189,000,000,-000 was spent directly, the remainder consumed in destruction of property and stoppage of industry.

It cost the United States \$32,000,-000,000, plus continuing costs of \$19,000,000,000, making a total of \$51,000,000,000.

\$51,000,000,000 would pay the cost of running the public elementary, high schools and colleges and universities for 17 years; would build two million miles of paved roads, which is three times the total mileage of surfaced roads now in use; would construct 15 million six-room houses; put 16 hospitals costing one million dollars each in every one of the 3,073 counties of the United States; and pay the unemployment-insurance premiums of everybody in the United States for more than 100 years at the New York State rate.

\$51,000,000,000 would do all of the following: wire all the 9,400,000 homes in the United States which do not have electricity; pay all the farm mortgages; install bathrooms with running water in the 80% of farm homes which do not have them now; double the present endowments of all institutions of higher

learning in the United States; build four consolidated high schools at a quarter of a million dollars each in every county of the United States; put a million-dollar airport in every county; build 10 bridges like the Tri-Borough Bridge; build another canal across the Isthmus; establish a five-billion-dollar program for the prevention of floods and soil erosion; set up an endowment fund which would provide \$100 a month for every blind person and deaf mute in the United States; finance the entire recovery and relief program from 1932; and endow an organization which would carry on the work of the League of Nations, the World Court and the International Labor Organization.

Combined national debts of all countries were increased from \$43,000,000,-000 to \$400,000,000,000. The cost of living was doubled. More than \$4,000,-000,000 of the expenditures annually in this country are the direct or indirect results of the World War.—Arthur W. Hawkins, Vice-President, Lincoln Bank and Trust Company, Syracuse, N. Y. *Westinghouse Magazine*, 11, 10 (Oct.), 1939.

* Figures from the International Chamber of Commerce.

Premarital and Prenatal Tests for Syphilis in New Jersey*

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THERE are interesting human sides of the story about blood tests for syphilis before marriage and during pregnancy, but I must stick close to this rather prosaic outline of our experiences in New Jersey:

- Why these laws happened to be passed.
- What they are.
- How they work.
- What the figures show.
- What we are doing with their results.
- How they are considered by our people.

Agitation in favor of a *Premarital Medical Examination* law, aimed particularly at the prevention of syphilis, was started in New Jersey in 1936 by what is known as the New Jersey Health and Sanitary Association. The idea was taken up and carried on aggressively by numerous other organizations, including the press, and was eventually sponsored in the Legislature by the State Department of Health. A letter of approval from Dr. Parran, reproduced and circulated widely, was a very effective part of our ammunition. Various forces had just begun to work stirring up a far greater interest than ever before in the venereal diseases and promoting a desire to do something about them. The general principle of this "*Marriage Bill*" could be readily understood, and it was one objective toward which any-

body could take definite steps easily and soon. Our legislators were impressed with the popular demand for action and, although there was an undercurrent of disapproval from some church groups, it was not difficult to secure the passage of the bill in the spring of 1938.

The "*Prenatal Bill*" was introduced in the same session of the Legislature, got the benefit of the publicity being given to a similar new idea in New York State, took on some of the momentum then moving more or less everything with a venereal disease flavor, and was passed without the slightest opposition.

The program of education, which has been one of the activities of the State Health Department's Bureau of Venereal Disease Control for twenty years, was a good background and, no doubt, played a real part in the general approval of these two new laws.

WHAT THE PREMARITAL LAW IS

We followed the lead of Connecticut with our *Premarital Bill* and got much valuable assistance and advice from their State Health Department, which had had practical experience during two years. Our law as passed was substantially as the bill had been drawn and, boiled down, is this:

It deals with syphilis only. Not more than 30 days before getting a marriage license, each person must secure a certifi-

* Read before the Child Hygiene Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939.

cate form divided in two parts. On one part an approved laboratory states that a blood sample from the person has been tested, but the *result* of the test is not given. On the other part of the form a "qualified physician" from any state, says that, after examining the person and considering the result of the blood test, it is his opinion "*that the person is not infected with syphilis or, if so infected, is not in a stage of that disease which may become communicable.*"

HOW THE PREMARITAL LAW WORKS

Several features of this law are probably responsible for the relatively little difficulty it has caused. It attempts to do only one rather definite and fairly simple thing, and it puts the responsibility for the decision on the physician. A provision of our law, which we have not seen elsewhere, is a real help in its administration. These certificates, mentioned above, must go along with the marriage records until they reach the Bureau of Vital Statistics of the State Department of Health to be permanently filed. This makes it possible for us to know how well the law is being observed and to check up on any source of irregularity. This is not very easy to do, if the health certificates are allowed to stay in the hands of the local officials who issue the licenses, as appears to be the practice in other states. In this connection let me say that, after the first few months, these certificates have come back with remarkable completeness so that not more than one or two are now irregular or missing from the several thousand marriage records filed each month.

DECREASE IN MARRIAGES

The influence of our law on the *number of marriages* has apparently been the same as in Connecticut and elsewhere. There was a sharp reduction after July 1, 1938, when our law went

into effect. Comparing marriages since that date with the previous year *alone* is not fair, because, in 1937, there were 3,400 *more* marriages in New Jersey than in any other year on record. Using for comparison the averages of corresponding periods of 1935-6-7, there was a 20 per cent reduction in marriages during the first 6 months of the law, but only a 7 per cent reduction in the second 6 months.

Pennsylvania has a law very similar to ours which will go into effect in May, 1940, and which will stop what little leakage of New Jersey marriages there may still be over our western border. New York's law started at the same time as ours did and effectively prevented people who wanted to avoid such requirements from going there.

APPROVED LABORATORIES

We have 85 laboratories, public and private, all in New Jersey, that are approved by the State Department of Health for making the premarital and prenatal blood tests. Incidentally, we have a system of checking our laboratories' tests by the use of standardized dried blood sera, but that is not a part of this discussion. An arrangement is in effect with the New York City Health Department whereby we accept their tests and they accept those made by our department. We expect similar reciprocity plans will eventually be made with the New York and Pennsylvania State Health Departments.

PREMARITAL BLOOD TESTS

Nearly all of the approved laboratories in New Jersey have made quarterly reports on the numbers of their premarital blood tests. We learn in this way that 62,764 such tests were made in the first full year of our law (July, 1938, through June, 1939). During this time, 56,664 persons were married in the state. Of these tests, 847 were positive. This is 1.35 per cent.

When you consider that repeat tests are often made on the positives, but almost never on the negatives, the actual number of persons with this evidence of syphilis is less than 847, as stated above. We have checked the names of those with 583 positive tests back and forth among four laboratories and found that only 62 (10.6 per cent) were duplicates. We feel that this small percentage of repeats is an indication that physicians do not have positive tests checked as regularly as they should, and we have broadcast a message to that effect. A printed set of suggestions about interpreting premarital blood tests,* which was sent by mail to all registered physicians in the state before the law went into effect, reads as follows on this point: "A *strongly positive* serologic test presumes the presence of syphilis, but it is wiser to repeat test before informing the applicant, unless a definite history of infection is obtained. . . . *Doubtful* reactions call for further physical examination and a repetition of test." Incidentally, this matter of duplicate positives is worth remembering in collecting statistics on the prevalence of syphilis in any groups that may be tested.

That positive tests should amount to only 1 per cent may seem a very small mouse to come out of all this mountain of legislation, expense, and fuss. But when you consider that it means at least 760 different persons in New Jersey, that a large proportion of them evidently had no previous knowledge of their infection, and that—as you will hear in a minute—many people in the earlier stages of syphilis are thus being persuaded to postpone marriage and start regular treatment, you will probably agree with us that our law is producing something of real value.

The U. S. Public Health Service has

published an article¹ in *Venereal Disease Information* which aims to prove that 1 per cent of apparently healthy young people planning to get married, or any other similar group, is entirely consistent with Dr. Parran's original statement—often misquoted and frequently misunderstood—"syphilis strikes one out of every ten adults."²

WHAT THE FIGURES SHOW

Several facts regarding our premarital blood tests will have to be stated very briefly.

The 62,764 tests were made as follows:

	Per cent
At the State Health Department Laboratory	48
Also without charge at 15 other public laboratories	47
At 69 private and hospital laboratories	5

From 521 persons with positive tests made at 4 laboratories the following facts were derived: 52 per cent were men, 48 per cent women, 53 per cent white, and 47 per cent Negroes.

WHITES AND NEGROES

We have gone into this matter of whites and colored in a great deal of detail with 48,000 tests at four laboratories. It appears that about 0.6 per cent of the white persons tested are positive as compared with 11.0 per cent of the Negroes. This is a relationship of about 1 to 18. If this is true of our people as a whole (I have no proof that it is), it would indicate that the Negro 5 per cent of our population has half the syphilis. It is obvious from these and many other figures that, in quoting the numbers or percentages or almost anything about syphilis, we must be careful to consider this racial difference, and perhaps to give it much more attention than we are doing in our syphilis control programs.

* Samples of forms may be obtained from the State Department of Health, Trenton, N. J.

WHAT IS BEING DONE ABOUT IT

In New Jersey we have no system whereby the names of positive reactors to tests for syphilis are reported from all other laboratories to the State Department of Health. However, the success of an experiment in checking up on persons who have positive premarital tests in our department has made available to us the records of three other large laboratories. Now 85 per cent of the tests in the state for premarital purposes are a part of a routine which brings us a great deal of information.

A carefully worded questionnaire about each person whose premarital blood test is positive is mailed to the physician who sent in the sample after about 3 months. We ask for confidential data in 7 questions which cover the following points:

Did you give the certificate authorizing the issuance of a marriage license?

If not, did or did not the person get married?

Is, or is not, the person getting treatment?

Provision is made in the last two pairs of questions for the answer, "I don't know."

All the doctor needs to do is to check a square to answer a question. A space is also provided where a check mark serves to report a potentially infectious person as delinquent from treatment and, therefore, no longer protected against investigation by the ethics of confidence.

For the sake of simplicity, I report here only on the 282 persons with positive tests made in the State Laboratory during the full year. Results from nearly as many other persons tested at the three other laboratories are proving to be substantially the same.

It is interesting to note that 95 per cent of these 282 questionnaires were filled out and returned by the physicians. They contain a great deal of information both individually and collectively. Many physicians go to considerable effort in explaining their answers to the ques-

REPORTS FROM PHYSICIANS ON 282 POSITIVE PREMARITAL CASES

(From New Jersey State Health Department Laboratory—1 year)

	<i>No.</i>	<i>Per cent</i>
Marriage certificates granted	120	43
Marriage certificates refused	147	52
No report	15	5
Total	282	100
Of those 147 refused certificates:		
Did not get married	90	61
Married out of state	29	20
Result not known	28	19
Total	147	100
Three months after the tests:		
Under treatment	153	57
Not under treatment	35	13
Disappeared	69	26
Not stated	10	4
Total	267	100

Reported by physicians as delinquent, to be followed up

48

At least half of the delinquents are being located by local boards of health and persuaded to continue treatment.

tions, and there has not been a single complaint of impropriety in our asking for these facts.

I can give you here only the briefest kind of a summary of the results of these efforts to find out what our marriage law really does.

HOW THE LAW IS CONSIDERED

Many physicians accept our invitation to comment on the premarital law in a space on the questionnaires. We have pages full of these quotations, only two of which I shall give. These are typical, and are repeated in different words again and again.

"The law in general is an excellent public health measure and seems to be well taken by the public."

"Prompt in treatments and coöperative. The law has great value; this patient was found only because of the law."

Six months after the law went into effect we sent a circular letter to a number of local registrars of vital statistics—the persons who issue marriage licenses—asking for an account of their experiences and requesting suggestions for simplifying the procedure or making the requirements of the law better known. There was a remarkable uniformity of approval in the 26 replies which were received.

We feel that there has been real value in the widespread publicity given to the law, both before and after it was passed, in which we had the whole-hearted support of the press, and which included the distribution of many thousands of copies of a simple leaflet of questions and answers issued by the State Department of Health. This is no doubt another reason for the general acceptance of the law and the smoothness with which it runs.

Here is one more quotation, somewhat exceptional it is true, but which we believe is an indication that our intensive program of education is making some impression on the people of our

state. A physician wrote on a premarital questionnaire: "I find that this woman has been married for 4 years. While drunk she walked into my office, said she was going to get married, and asked for a blood test."

THE NEW JERSEY PRENATAL LAW

The story of our *Prenatal Law* is much less complete and definite. For one thing, it has been in effect only since January 1 of this present year; for another, it is of such a nature that its provisions are harder to enforce and its results far more difficult to see.

Briefly, this law provides that physicians shall take blood specimens for tests for syphilis from all pregnant women at the time of the first examination. Midwives, and others not authorized to take such samples, shall call in a qualified physician for the purpose. Birth and stillbirth certificates must include a statement of whether or not the mother's blood was tested, *but not the result*. If the test was made, the approximate date shall be given.

It is obvious that this is largely an educational measure, as there are no penalties for its avoidance and no specification that treatment shall follow positive blood tests. As with the marriage law, a great deal of publicity was given to this by the press and through various other channels available to the state and local departments of health.

From what we can learn, this law is well thought of, and we have already been able to collect a lot of figures.

PRENATAL BLOOD TESTS

Laboratories often do not know which blood specimens are from prenatal cases because there is no requirement that they be so identified. In many instances, however, the forms that accompany the blood samples are marked, and from 58 laboratories we learn that during the first 6 months of the law 19,752 prenatal tests have been made. Of these,

272 were positive. This is 1.38 per cent, almost the same as the percentage of positive premarital tests. So far we have been able to break down only a few of the figures, but from our state laboratory it appears that about 0.4 per cent of the white women tested are positive and about 6.0 per cent of the Negroes.

We have been agreeably surprised at the way in which the information about the tests has been given on birth certificates, in spite of the fact that it has taken a long time to get the new forms, with spaces provided for the purpose, out into circulation. During the month of March, 56 per cent of the birth certificates that came in had the notation about prenatal tests. In May there were 69 per cent; in August 84 per cent; in September 87 per cent.

The essence of the matter is, of course, to get the tests made *early* so treatment, if needed, can be most effective. We have secured some information from birth certificates for the month of May on this point, representing 3,232 women who were tested. This is condensed as follows:

<i>Tests Made</i>	<i>Per cent</i>
Prior to 5th month of pregnancy	20
In 5th month	17
In 6th month	14
In 7th month	13
In 8th month	8
In 9th month	20
Month not stated	8
	<hr/> 100

PRENATAL QUESTIONNAIRES

The *premarital* questionnaire scheme proved to be so successful that we are trying it on the *prenatal* cases with positive blood tests. These sheets make it easy for the physicians to answer the following questions: At what time in pregnancy was this test made? Was the presence of syphilis formerly known to the woman? Has treatment previously been given? Has treatment been given in this pregnancy? If the baby has been

born, what is its condition? Does it have any evidence of syphilis? What do you think of this law?

While these facts are not yet available about large numbers of cases, it is interesting to note what we have learned in 6 months.

One hundred and twenty-seven questionnaires went out; 114 have been returned—90 per cent; 12 were eliminated as not syphilis or not pregnant.

Tests were made at all times in pregnancy, almost equally distributed through the 8 months. Only 15 per cent of the women admitted knowing they had syphilis, and 14 per cent said they had *previous* treatment. Treatment was followed *since* the tests by 70 per cent.

Sixty-two pregnancies were definitely reported as terminated.

Forty-nine apparently healthy babies had been born.

Three obviously had syphilis.

Seven were stillbirths or miscarriages.

Three babies died soon after birth.

It appeared that very few blood tests on babies had been made.

You will readily realize that painstaking efforts on our part must be carried out over a much longer period to collect such facts in sufficient volume to be really valuable, and it is our intention to see that this is done. In fact, it is our obligation, after advocating the passage of both of these laws, to learn as much about their results as we can.

No matter if a law or a regulation, or anything else, appears to be perfect and its administration has been made as nearly foolproof as humanly possible, there are bound to be special cases and other reasons why its actual operation is not 100 per cent. I illustrate by one more quotation, again from a physician who wrote this on one of our premarital questionnaires: "This woman has twins by the person she was about to marry. Under the circumstances I thought best to grant the certificate but,

for reasons unknown to me, the marriage did not take place." Here we have a woman with twins, a blood test, syphilis, a health certificate, and a man—and still she didn't get married.

SUMMARY

Widespread public interest in the subjects of premarital and prenatal tests for syphilis, carefully prepared legislation, and a great deal of publicity are evidently the reasons the machinery of the new laws runs smoothly.

Large numbers of blood tests for syphilis are being made on young adults who would not otherwise have them. New cases are being found at the rate of about 1 per cent of those tested, which means at least 1,000 persons in the state in the course of a year. Many of these people, it appears, have no previous knowledge of their infection.

Most of the tests are made in public laboratories. Premarital positive tests are equally divided between men and women.

Negroes with syphilis outnumber whites by a wide margin on a percentage basis (at least 15 to 1).

Physicians are ready and willing to tell the State Department of Health, by means of simple questionnaires, what happens to the persons who have positive premarital and prenatal blood tests.

Premarital Tests

Nearly half (43 per cent) of the persons with positive tests are being given the certificates and are getting married.

More than half (57 per cent) of all those with positive tests are under treatment for at least 3 months.

Good coöperation is secured from physicians and health officials in following up delinquents from treatment.

Prenatal Tests

The law requires that statements be put on birth certificates as to whether or not blood tests were made on the mothers during pregnancy. This is being done at an increasing rate—87 per cent after the law had been in effect for 9 months.

The time in pregnancy when tests are made is stated on the birth certificates. Only 20 per cent of the tests appear to be prior to the 5th month.

Only 14 per cent of 102 positive cases had had previous treatment, but 70 per cent had treatments after the prenatal blood tests. Studies are being made of the condition of babies born, the presence or absence of syphilis, and the relation of time of prenatal tests and amount of treatment.

Physicians, registrars of vital statistics, and health officials questioned report almost unanimously that both these laws are well received by the public, have valuable educational features, and in their opinions are sound procedures in public health.

REFERENCES

1. Vonderlehr, R. A., and Usilton, L. J. The Chance of Acquiring Syphilis and the Frequency of Its Disastrous Outcome. *V. D. Inform.*, U.S.P.H.S., 19, 11:396 (Nov.), 1938.
2. Farran, Thomas, M.D. The Next Great Plague to Go. *Survey Graphic*, July, 1936.

Public Health Degrees and Certificates Granted in 1938 and 1939

THE Committee on Professional Education of the American Public Health Association presents a report of public health degrees and certificates granted in the calendar years 1938 and 1939. These tables are comparable to reports published for preceding years¹ with the exception that, beginning with this report, the basis of the record has become the number of students receiving degrees, rather than the number of degrees granted in the specified period.

Enrollment in Public Health Courses

Number of students enrolled, and Public Health Degrees and Certificates conferred in the years 1938 and 1939 by United States and Canadian Universities. Unless otherwise indicated courses require at least 1 year of residence.

TABLE I

Name of University	Number of Students Registered		Degrees and Certificates Offered	Number of Graduates Receiving Degrees	
	1937-1938	1938-1939		1937-1938	1938-1939
DeLamar Institute of Public Health, Columbia University	22	26	M.S.P.H.	19	14
Harvard School of Public Health	36	54	Dr.P.H.	2	2
			M.P.H.	21	37
			C.P.H.	7	3
Johns Hopkins University School of Hygiene and Public Health	162	166	Dr.P.H.	11	3
			M.P.H.	0	71
			Sc.D.	8	11
			Sc.M.	3	4
			C.P.H.	64	0
Massachusetts Institute of Technology	64	58	S.B.	2	3
			S.M.	0	1
			Sc.D.	0	0
			Ph.D.	0	0
			Dr.P.H.	0	0
			C.P.H.	0	4
McGill University Faculty of Medicine	0	2	D.P.H. ²	0	2
University of California ³	28	49	C.P.H.	15	22
			A.B.	8	13
			M.A.	0	1
University of Michigan School of Hygiene and Public Health	191	252	M.S.P.H.	35	67
			Dr.P.H.	3	2
University of Minnesota	7	10	C.P.H.	2	2
			M.S.	0	3
University of North Carolina ⁴					
University of Toronto School of Hygiene	18	17	D.P.H. ²	18	16
University of Western Ontario	0	0	D.P.H. ²	0	0

¹ *A.J.P.H.*, Vol. 28, p. 863; Vol. 27, p. 1267; Vol. 26, p. 819; Vol. 25, p. 341; Vol. 23, p. 1124.

TABLE I (Cont.)

Name of University	Number of Students Registered		Degrees and Certificates Offered	Number of Graduates Receiving Degrees	
	1937-1938	1938-1939		1937-1938	1938-1939
Vanderbilt University School of Medicine ⁵					
Wayne University College of Medicine	2	2	Dr.P.H.	1	0
Yale University Department of Public Health	29	37	M.P.H. Dr.P.H. Ph.D.	8 5 1	5 2 1
Total	559	673		233	289

² Diploma in Public Health.

³ In addition to the regular courses, short courses of 1 semester plus 4 weeks' field training period or 12 weeks have been offered through 1938-1939. Seventy-four students registered in 1937-1938 and 38 in 1938-1939. "Certificates of Attendance" were given to 46 students in 1938 and 17 in 1939.

⁴ Short courses only have been offered through 1938-1939. "Academic Awards" for satisfactory completion of courses were given to 35 health officers in 1937-1938 and to 25 in 1938-1939.

⁵ Short courses of post graduate instruction, two each year, each 3 months in length. No degrees or certificates awarded.

Classification of Public Health Degrees and Certificates Granted in 1938 and 1939

Number of persons receiving Degrees and Certificates by reason of public health courses completed:

TABLE II

Degree	No. of Persons Receiving Degrees and Certificates		No. of Schools Offering Each Degree and Certificate
	1938	1939	
Doctor of Public Health	22	9	6
Doctor of Science	8	11	2
Doctor of Philosophy	1	1	2
Certificate in Public Health	88	31	5
Master of Public Health	29	113	3
Master of Science in Public Health	54	81	2
Master of Science	3	8	3
Master of Arts (Public Health Major)	0	1	1
Diploma in Public Health	18	18	3
Bachelor of Science in Public Health	2	3	1
Bachelor of Arts (Public Health Major)	8	13	1
Total	233	289	

College Enrollment in Courses Fundamentally Engineering in Character But Providing Training in Public Health Work

TABLE III

Name of University	College Enrollment		Degrees Offered	Number of Persons Receiving Degrees	
	1937-1938	1938-1939		1937-1938	1938-1939
Agricultural & Mechanical College of Texas	8	12	B.S. in C.E. M.S. in C.E.	8 0	8 1
Cornell University	2	2	C.E. B.S. in C.E. M.S. in Eng.	2 0 0	2 0 0
Harvard University (Graduate School of Engineering)	41	52	S.M. in Eng. (San.) S.D. S.M. (San. Chem.)	24 1 0	32 2 1

(Table III Cont. on page 1340)

TABLE III (Cont.)

Name of University	College Enrollment		Degrees Offered	Number of Persons Receiving Degrees	
	1937-1938	1938-1939		1937-1938	1938-1939
Iowa State College	127	164	M.S. in San. Eng. B.S.	1 22	0 36
Johns Hopkins University	1	4	Bachelor of Eng. Master of Eng. Doctor of Eng.	0 0 0	0 0 0
Lehigh University	2	2	B.S. in San. Eng.	0	1
Massachusetts Institute of Technology	8	11	S.B. in P.H.Eng. S.M. in P.H.Eng. Ph.D. in P.H.Eng. Sc.D. in P.H.Eng. Dr.P.H. in P.H.Eng. S.B. in San. Eng. S.M. in San. Eng. Sc.D. in San. Eng.	1 0 0 0 0 2 1 0	2 1 0 0 0 0 1 0
New York University	52	63	B.C.E. (San. option) M.C.E. (San. option)	7 4	9 9
Pennsylvania State College	15 Undergrad. 1 Grad.	18 Undergrad. 1 Grad.	B.S. in San. Eng. M.S. in San. Eng. Ph.D.	1 0 0	6 1 0
Rutgers University	14	20	B.Sc. in San. Science B.Sc. in San. Eng. M.Sc. Ph.D.	3 2 0 1	1 1 1 3
Stanford University (Graduate School)	5	4	Eng. in Civil Eng.	1	1
State University of Iowa	26	27	B.S. in C.E. B.S. in Ch.E. M.S. in Ch.E. M.S. in Chemistry Ph.D. (Fundamentally Chem.)	8 1 0 5 5	4 3 1 4 4
University of California	40	40	B.S. in C.E.	13	9
University of Illinois	10	12	B.S. in C.E. M.S. in C.E. Ph.D.	6 1 0	5 0 0
University of Kansas	3	4	B.S. in C.E. (Sanitary) M.S. in C.E. (Sanitary)	2 1	4 0
University of Minnesota	8	11	C.P.H. M.S.	0 3	0 1
University of Toronto (post-graduate only)	0 ¹	2	M.A.Sc.	0 ¹	2
West Virginia University	33	36	B.S.C.E. (San. option) B.S.C.E. (Structural option)	2 4	4 3
Total	396	485		132	163

¹ No courses given prior to academic year 1938-1939.

Public Health Nursing Degrees and Certificates Granted 1937-1938

There were approximately 3,700 nurses studying public health nursing in the programs of study which met certain requirements in regard to theoretical and practical instruction according to the standards of the National Organization for Public Health Nursing. About 2,700 were enrolled during the academic year and 1,000 in summer sessions. Two universities reported enrollments of more than 500 each during the academic year—Wayne and Columbia Universities. Five colleges and universities each reported more than 100 enrolled at summer sessions—the Universities of Michigan, Minnesota, Columbia, Syracuse, and George Peabody.

Of the 2,700 students attending during the academic year, almost half, 46.6 per cent had registered for the first time at the institutions reporting them as 1937-1938 students.

Social security stipends assisted 22.1 per cent of the public health nurses enrolled during the academic year. Of those who received certificates, 23.9 per cent had used social security stipends during the year.

The following table indicates the number of students who received degrees and certificates in Public Health Nursing for this period. These figures have been supplied by the National Organization for Public Health Nursing and are printed here with permission. Note: No report received from Simmons College.

TABLE IV

<i>Program of Study</i>	<i>Certificates</i>	<i>B.S. or B.A. Degree</i>	<i>M.S. or M.A. Degree</i>
University of California Division of Nursing Education	60	59	0
Catholic University of America School of Nursing Education	14	10	0
University of Michigan Division of Hygiene and Public Health	27	8	3
Wayne University Department of Nursing	55	4	0
University of Minnesota Department of Preventive Medicine and Public Health	6	40	0
Teachers College, Columbia University Division of Nursing Education	0	35	8
Fordham University School of Social Service	3	0	0
University of Syracuse Department of Public Health Nursing	12	3	0
Ohio State University School of Nursing	0	20	0
Western Reserve University School of Applied Social Sciences	44	0	4
University of Oregon Medical School Department of Nursing Education	26	21	0
University of Pennsylvania Department of Nursing Education	20	5	0
George Peabody College for Teachers Department of Nursing Education	48	12	1
Vanderbilt University School of Nursing	14	3	0
Medical College of Virginia St. Philip School of Nursing	15	0	0
College of William and Mary, Richmond Division School of Social Work and Public Health Nursing	31	1	0
University of Washington School of Nursing Education	42	17	1 ¹
University of Hawaii Department of Public Health Nursing	5	0	0
Total	422	238	17

¹ Degree of Master of Nursing

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The Educational Qualifications of Health Officers*

THE type of training most desirable for an individual seeking to become a health officer is well recognized. He should have had fundamental training in the sciences and the humanities at least equivalent to that required for a college degree in Arts or Science. He should have completed the course leading to the degree of Doctor of Medicine in a recognized medical school, and should have had at least one year of internship in an approved general hospital, including a communicable disease service. In addition to such internship the candidate should be given a preliminary period of supervised field experience in a well organized department of health for a period sufficient to give him acquaintance with the general aspects of public health, and to give him also opportunity to determine something of his own liking for the work and his fitness for it. At the end of this preliminary field experience the candidate should receive at least one full academic year of graduate instruction in public health in a university. If possible the candidate should have an additional year of practical experience in a subordinate position before becoming himself responsible for the conduct of the work of a department of health.

However desirable so complete a course may be, it is impracticable at this time to insist that all candidates for appointment comply with these require-

ments. In view of this practical situation, some modification may temporarily be made in the direction of recognizing the value of practical field experience obtained under competent supervision as in some measure substituting for formal education.

Certain individuals not possessing a medical degree have achieved success as administrative health officers. It is reasonable, therefore, that the basic training represented by the medical degree, although advisable, need not necessarily be considered absolutely essential in the selection of health officers for jurisdictions where the duties of the health officer are mainly administrative, provided the candidate possesses an adequate general and biological education, has received not less than 2 academic years of graduate instruction in public health, and has had one or more years of administrative experience in some position in a recognized health organization as prerequisite for the duties of health officer.

Because of the unmistakable trend upon the part of governmental bodies to insist upon the medical degree as a prerequisite to appointment as health officer, and because it is impossible to foresee whether the prospective health officer will be located in a health department where his duties are restricted to administrative functions, it is inadvisable to encourage the candidate for a public health degree to look forward to a career as health officer unless he is also the possessor of a medical degree, and for these reasons our recommenda-

* Approved by the Governing Council of the American Public Health Association, October 18, 1939, on recommendation of the Committee on Professional Education.

tions contain no reference to the non-medical health officer.

RECOMMENDATIONS

1. That candidates for appointment as health officer should be graduates of approved medical schools who have completed successfully not less than one year of internship in an approved hospital and in addition a course of not less than one year of graduate instruction in a university, leading to a degree in public health.*

* Where lack of qualified personnel makes it impossible to require a full year of graduate instruction in public health, the postgraduate requirements considered temporarily as applicable for medical health officers for small jurisdictions may be: the satisfactory completion of not less than 3 months of post-graduate instruction in public health in a university, and not less than 3 months of supervised field experience in a well organized health department. Such individuals should be required to complete the course leading to a graduate degree in public health as soon as they have demonstrated ability sufficient to warrant such instruction.

2. That recognition be given to the fact that practical experience in public health administration is an essential part of the education of a health officer, and that great achievement can usually be attained only after long experience. These facts should always be taken into consideration in the selection of health officers, particularly where the position is one of great administrative responsibility.

The above recommendations are made for the future guidance of officials responsible for the appointment of health officers, and for the guidance of individuals looking forward to careers in public health. In making these recommendations the American Public Health Association expressly recognizes the professional standing of persons now performing creditable service as health officers.

Advances in Thiamin Research^{*}

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and

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THE concerted effort of many research centers has been necessary to evaluate the rôle of thiamin in human and animal nutrition. The fundamental questions which necessarily attend the elucidation of each new nutritional factor continue to receive attention as older methods are made more exact and new ones are introduced. The problems of distribution, stability, quantitative requirements and physiological rôle are receiving serious consideration at the present time.

The chemical estimation of thiamin by the thiochrome procedure¹ which depends on the alkaline oxidation of thiamin with ferricyanide is being used in a number of laboratories. Cerecedo and Hennessy's finding² that zeolite absorbs the vitamin has provided a new approach to the thiochrome assay procedure³ which may obviate earlier difficulties. Melnick and Field⁴ have incorporated the use of zeolite into the colorimetric procedure of Prebluda and McCollum⁵ which is based on the reaction of the vitamin with diazotized p-aminoacetophenone along with xylene extraction and report favorable results

after an extensive series of experiments. Assays on a number of biological materials, after phosphatase treatment, yielded values in accord with previous biological assays. Willstädt and Barany⁶ have obtained promising results with the use of diazotized 2, 6-dichloraniline.

The fermentation methods of Frey, *et al.*⁷ offer possibilities where it is necessary to estimate small amounts of the vitamin. They have refined their method⁸ by determining the thiamin values before and after ferricyanide treatment which destroys only the vitamin. Birch and Harris,⁹ and Baker and Wright¹⁰ have assayed a variety of biological materials for thiamin by the bradycardia procedure with rats. The *Phycomyces* procedure¹¹ may also prove of value under controlled conditions.¹² The organism does not require the intact molecule and its value is thus additionally limited. In this connection it is interesting to note that the Abderhaldens¹³ have found that pigeons are also able to respond to the separate thiazole and pyrimidine components of the thiamin molecule when these are administered in large amounts.

The recognition of new factors in the vitamin B complex and the development of more exact methods for their estimation makes it evident that earlier assays

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for thiamin will be revised in many instances. Baker and Wright¹⁰ have supplied extensive tables on a wide variety of food materials assayed with rats by the bradycardia procedure. The findings of Elvehjem, *et al.*,¹⁴ Table 1,

TABLE 1

Recent Values on the Thiamin Content of Selected Foods

Food	Thiamin Content, Dry Basis	
	µg. per gm.	I.U. per gm.
Beef heart	30	10
Beef kidney	15	5
Beef liver	12	4
Lamb liver	12	4
Lamb, leg of	12	4
Pork ham	33-60	11-20
Smoked ham	33	11
Canned ham	26	8.6
Pork heart	25.5	8.5
Pork kidney	24	8
Pork liver	16	5.3
Pork loin	39-60	13-20
Milk		1.8
Potatoes, boiled and peeled		1.2
White bread (fresh basis)	0.14-0.2	
Brown bread (fresh basis)	0.5-0.7	
Whole wheat bread (fresh basis)	1.15-1.2	
Wheat, whole grain (fresh basis)	1.2-3.4	

show that meats may serve as one of the rich sources of thiamin in the diet. As indicated by these investigators, meats may supply up to one-third of the daily requirement for thiamin, even when supplied at a level of 7 per cent in the diet. That meats, particularly when not too well done, may serve as a good source of thiamin is in accord with the observations of Stefansson¹⁵ who recently noted that northern people consuming large quantities of meat never suffer from lack of this factor.

Stiebeling and Phipard¹⁶ have recently completed an extensive survey on the diets of families of employed wage earners and clerical workers in cities. An estimation of the thiamin intake based on the literature values for the foods consumed indicated that all groups

received more than 240 I.U. of thiamin chloride per day estimated in terms of an average man. About half of the families examined received 500 or more I.U. of thiamin chloride per day. Baker, *et al.*¹⁷ have concluded that the best fed members of the English population today, while getting twice as much thiamin as people in the low income group, consume less thiamin than the parish poor of the 18th and early 19th century.

The question of the stability of thiamin has interested investigators in the field for some time. The thiamin contained in cod roe has been reported to be comparatively stable to processing conditions, a loss of only 20 per cent having been observed.¹⁸ Our own studies with dry animal tissues¹⁹ demonstrated that the thiamin contained in these tissues was comparatively stable during a 2 year storage period. The losses of thiamin did not exceed 20 per cent in any of the four tissues assayed.

The evidence on the decrease in thiamin content during cooking is encouraging. Elvehjem, *et al.*,¹⁴ Table 2, studied the effects on meats of frying, roasting, broiling, baking, and stewing. It was found that frying smoked ham, beef round, and pork ham for 15 to 20 minutes did not materially affect the thiamin content. Frying pork loin and veal hindquarter decreased the thiamin content by 35-45 per cent. Roasting, broiling, baking, and stewing decreased the thiamin content by approximately half in the meats studied. It will be noted that the time and temperature involved in these methods of food preparation is longer than that of frying.

The results just mentioned on the vitamin content of processed and cooked meats bear on the results reported by Stiebeling and Phipard.¹⁶ These investigators were aware of this difficulty and estimate that their values are high. The correction factor required to convert

TABLE 2

Stability of Thiamin During Household Cooking Processes

<i>Process</i>	<i>Meat</i>	<i>Processing Time Min.</i>	<i>Destruction of Thiamin Per cent</i>
Frying	Beef round	20	none
	Veal hindquarter	20	45
	Pork ham	15	none
	Smoked ham	15	10
	Pork ham	medium well done	35
<i>Hours</i>			
Roasting	Beef round	2.5	61
	Veal hindquarter	2	58
	Pork loin	1.5	50
Broiling	Beef round	20 min.	50
Baking	Pork loin	1 hr.	50
Stewing	Beef heart	1 hr.	55
	Beef kidney	45 min.	40

their values to the actual conditions cannot be estimated without further data. Baker and Wright²⁰ believe that beriberi may occur on diets supplying 400 or more I.U. of thiamin chloride daily. The protective level according to Baker and Wright may vary according to body weight and food consumption. Harris and Leong²¹ have calculated from Baker and Wright's thiamin values of foodstuffs, as determined by the bradycardia method, that 250 I.U. per day represents the amount of thiamin found in the ordinary middle class dietary in England.

The daily intake of thiamin must therefore be related to the daily requirement in order to utilize the results on the thiamin content of food materials. Stiebelling and Phipard¹⁶ have accepted the earlier values submitted by Cowgill and his coworkers²² and estimate the daily requirement for a 70 kg. man consuming 3,000 calories per day to be 300 I.U. Our own studies with rats, chicks,²³ and dogs²⁴ have indicated that the thiamin requirements of various species may be expressed in a slightly different way. While different criteria may be used for the estimation of minimum vitamin requirements, we have

found that normal growth resulted when the diet of these species was supplemented with 80 to 100 μ g. (micrograms) of thiamin chloride per 100 gm. of low fat diet. The uniformity of results with rats, chicks, and dogs led us to conclude that the human requirement for the antineuritic factor was probably in the same range.

This conclusion is in accord with that of Williams and Spies,²⁵ independently reached as a result of their literature studies on diets borderline to deficient in thiamin as evidenced by actual field observations. On this basis, therefore, the thiamin requirement for a 70 kg. man consuming 3,000 calories or approximately 750 gm. of food should be 600–750 μ g. or 200–250 I.U. of thiamin chloride per day. This level of the vitamin is certainly very close to the minimum and it would be well to supply 2 to 3 times this level. Referring once again to the survey of Stiebelling and Phipard¹⁶ wherein these investigators found that the diets of half the employed workers supplied less than 400 I.U. of thiamin chloride per day without allowance for losses involved during cooking, one may consider that the dietaries of even self-sustaining

families under modern conditions are close to borderline in their content of this factor.

The physiological rôle of thiamin in the body has been studied by a number of workers. Kinnersley and Peters reported in 1929²⁶ that thiamin was associated with carbohydrate and, more specifically, with lactic acid oxidation. Thompson and Johnson demonstrated in 1935²⁷ that the blood of thiamin deficient pigeons contained abnormal amounts of pyruvic acid. This finding was confirmed and extended by Sherman and Elvehjem²⁸ who reported reduced pyruvate oxidation by cerebral and kidney tissue of polyneuritic chicks. Peters in 1936 was led to state that thiamin was either acting as a coenzyme to pyruvic oxidase or constituted the prosthetic group itself. This line of investigation was culminated by the fundamental finding of Lohmann and Schuster in 1937,²⁹ studying the chemistry of the coenzyme for the decarboxylation of pyruvic acid in yeast, that cocarboxylase was thiamin pyrophosphate. Peters, *et al.*³⁰ have recently reported evidence to show that thiamin pyrophosphate is the active principle which gives the catatorulin effect with avitaminous pigeon brain tissue. Goodhart and Sinclair³¹ have reported that the cocarboxylase of the blood is contained entirely within the blood cells which indicates that the readily diffusible form of the vitamin exists either as free thiamin or thiamin phosphate. Elvehjem, *et al.*³² have shown that free thiamin may be distinguished from cocarboxylase in boiled tissue extracts by the proper combination of iodoacetate and fluoride. Lipmann³³ has observed that certain bacteria containing little adenylypyrophosphatase shaken with adenylic acid and pyruvic acid removed inorganic phosphate. This indicated synthesis of adenosinepyrophosphate and, therefore, a linkage between the thiamin and adenylic acid systems

which could supply a new source of energy for phosphorylation.

Evans and Lepkovsky demonstrated in 1928³⁴ that rats fed high fat diets required less thiamin for normal growth than those fed low fat diets. This finding was subsequently confirmed by Salmon and Goodman,³⁵ and Elvehjem, *et al.*^{24, 36} Richter, *et al.*³⁷ have added additional evidence on this point by their technic of free choice experiments. Nine rats on an adequate self-selection diet were rendered deficient in thiamin by the omission of yeast from the diet. At the height of the deficiency, the animals had a marked aversion for carbohydrate and protein, and a craving for fat.

More recently, we have observed in studies with dogs²⁴ that the thiamin requirement may be expressed in terms of the non-fat, energy supplying food-stuffs. Thus, dogs fed low fat diets required 75 μ g. of thiamin chloride per 100 gm. of diet for normal growth. An increase of the fat content of the diet to 56.5 per cent decreased the thiamin requirement of the dogs to 27.5 μ g. per 100 gm. of diet. When the thiamin chloride content of the high fat diet was expressed in terms of the non-fat energy supplying food materials, the requirement was similar to that found with the low fat diet, namely, 75 μ g. per 100 gm. of non-fat dietary constituents. These results are in agreement with the conclusions of Williams and Spies²⁵ who stated that the thiamin sparing action of lard is not due to contained thiamin. This was recently confirmed by Melnick and Field.³⁸ The Michigan workers applied their colorimetric procedure⁴ for thiamin to lard and concluded that it did not contain the vitamin. They were able to recover added thiamin under the same conditions.

These findings have immediate application in that they indicate that the daily requirement in the human dietary

is partly decreased in proportion to the amount of fat supplied by the foods consumed.

Engel and Phillips³⁹ have recently observed that polyneuritic rats cured with crystalline thiamin chloride have abnormal livers as judged by histological examination although no chemical differences could be demonstrated. Polyneuritic animals fed thiamin-low, high fat diets recovered without liver degenerative changes.

The findings of Harris, *et al.*⁴⁰ are important in that they demonstrate quite clearly that the saturation level of thiamin for the rat is readily reached at approximately 10 times (30 I.U.) the requirement level. Examination of the tissues indicated that they were unable to store the vitamin to any extent in contrast to the ability of the body to store the fat soluble vitamins. These investigators report that the urinary excretion of vitamin B₁ may be used as a useful guide for assessing the state of nutrition; a resting level of 10–20 I.U. per day and a response of at least 30 I.U. after the administration of a 350 I.U. test dose may be regarded as indicating normal nutrition.

Perla⁴¹ has made the interesting observation that added amounts of thiamin to a stock colony diet for rats at a level of 30 to 50 I.U. daily resulted in interference with lactation, loss of maternal instinct, cannibalism, and progressive loss of fertility. Sure⁴² has confirmed these observations. No reproduction disturbances resulted⁴¹ when 2 mg. of Mn. (as MnCl₂) daily were added to the diet of the rats parenterally injected with 200 I.U. daily.

Thiamin therapy in human disorders is now being applied on an ever widening front. Recent contributions can only be referred to briefly here. The vitamin has been found effective in cases of hyperthyroidism and tachycardia,⁴³ edemas of nurslings,⁴⁴ intractable pain, and inflammatory and

degenerative diseases of the central nervous system,^{45, 46} chronic diarrheas and atonic constipation,⁴⁷ multiple deficiencies,⁴⁸ and "pernicious vomiting" of pregnancy.⁴⁹

SUMMARY

We may state that the physiological rôle of thiamin in the body has definitely been shown to be associated with the metabolism of pyruvic acid and related keto acids, intermediates in glycolysis. On the basis of studies with laboratory animals, we have suggested that the daily requirement for all species is approximately 1 p.p.m. of low fat dietary solids. This requirement is decreased in the presence of increased amounts of fat in the diet. The requirement must be satisfied by almost constant intake since the body is unable to store appreciable amounts of the vitamin. Studies on the dietaries of middle class families in England and similar groups in this country have indicated the daily thiamin intake is close to the borderline requirement level. A distinction must be made between the requirement level and the optimum level. With the development of simpler and more rapid methods for the determination of the vitamin and new criteria for its function, it will be possible to determine whether the level for optimum nutrition is appreciably above the requirement level.

REFERENCES

1. Westenbrink, H. G. K., and Jansen, B. C. P. *Acta brev. neerl. Physiol.*, 8:119, 1938; Westenbrink, H. G. K., and Goudsmit, J. *Enzymologia*, 5:307, 1938; *Nature*, 142:150, 1938.
2. Cerecedo, L. R., and Hennessy, D. J. *J. Am. Chem. Soc.*, 59:1617, 1937.
3. Hennessy, D. J., and Cerecedo, L. R. *J. Am. Chem. Soc.*, 61:179, 1939.
4. Melnick, D., and Field, H., Jr. *J. Biol. Chem.*, 127:505, 515, 531, 1939.
5. Prebluda, H. J., and McCollum, E. V. *J. Biol. Chem.*, 127:495, 1939.
6. Willstädt, H., and Bárány, F. *Enzymologia*, 2:316, 1938.
7. Schultz, A. S., Atkin, L., and Frey, C. N. *J. Biol. Chem.*, 129:471, 1939; *J. Am. Chem. Soc.*, 59:2957, 1937; Heyns, K. *Ztschr. f. physiol. Chem.*, 219:37, 1939.
8. Schultz, A. S., Atkin, L., and Frey, C. N. *J. Am. Chem. Soc.*, 60:3084, 1938.

9. Birch, T. W., and Harris, L. J. *Biochem. J.*, 28:602, 1934.
10. Baker, A. Z., and Wright, M. D. *Biochem. J.*, 29:1802, 1935; 32:2156, 1938.
11. Schopfer, W. H., and Jung, A. *Compt. rend. soc. de biol.*, 122:249, 1936.
12. Sinclair, H. M. *Biochem. J.*, 32:2185, 1938.
13. Abderhalden, E., and Abderhalden, R. *Arch. f. d. ges. Physiol. (Pflügers)* 240:746, 1938.
14. Mickelsen, O., Waisman, H. A., and Elvehjem, C. A. *J. Nutrition*, 17:269, 1939.
15. Stefansson, V. *Science*, 89:484, 1939.
16. Stiebeling, H. K., and Phipard, E. F. *U.S.D.A. Circ.* 507, 1939.
17. Baker, A. Z., Wright, M. D., and Drummond, J. C. *J. Soc. Chem. Ind.*, 56:191, 1937.
18. Lunde, G., and Kringstad, H. *Tidsskr. Hermetikind.*, 24:184, 1938.
19. Arnold, A., and Elvehjem, C. A. *Food Research*, 3:367, 1938.
20. Baker, A. Z., and Wright, M. D. *Proc. Roy. Soc. Med.*, 29:1145, 1936.
21. Harris, L. J., and Leong, P. C. *Lancet*, 230:886, 1936.
22. Cowgill, G. R. *The Vitamin B Requirement of Man*. Yale Univ. Press, New Haven, 1934.
23. Arnold, A., and Elvehjem, C. A. *J. Nutrition*, 15:403, 429, 1938.
24. Arnold, A., and Elvehjem, C. A. *Am. J. Physiol.*, 126:289, 1939.
25. Williams, R. R., and Spies, T. D. *Vitamin B₁ and Its Use in Medicine*. Macmillan, 1938.
26. Kinnersley, H. W., and Peters, R. A. *Biochem. J.*, 23:1126, 1929.
27. Thompson, R. H. S., and Johnson, R. E. *Biochem. J.*, 29:694, 1935.
28. Sherman, W. C., and Elvehjem, C. A. *Biochem. J.*, 30:785, 1936; *Am. J. Physiol.*, 117:142, 151, 1936.
29. Lohmann, K., and Schuster, P. *Naturwissensch.*, 25:26, 1937; *Biochem. Ztschr.*, 294:188, 1937.
30. Banga, I., Ochoa, S., and Peters, R. A. *Biochem. J.*, 33:1109, 1939.
31. Goodhart, R. S., and Sinclair, H. M. *Biochem. J.*, 33:1099, 1939.
32. Lipton, M. A., Potter, V. R., and Elvehjem, C. A. *Biochem. J.*, 32:474, 1938; *J. Biol. Chem.*, 124:147, 1938.
33. Lipmann, F. *Nature*, 143:281, 1939.
34. Evans, H. M., and Lepkovsky, S. *Science*, 68:298, 1928; *J. Biol. Chem.*, 83:269, 1929.
35. Salmon, W. D., and Goodman, J. G. *J. Nutrition*, 13:477, 1937.
36. Stirn, F. E., Arnold, A., and Elvehjem, C. A. *J. Nutrition*, 17:485, 1939.
37. Richter, C. P., Holt, L. E., Jr., Barelare, B., Jr., and Hawkes, C. D. *Am. J. Physiol.*, 124:596, 1938.
38. Melnick, D., and Field, H., Jr. *J. Nutrition*, 17:223, 1939.
39. Engel, R. W., and Phillips, P. H. *J. Biol. Chem.*, 128:25, 1939.
40. Leong, P. C. *Biochem. J.*, 31:367, 373, 1937; Harris, L. J., Leong, P. C., and Ungley, C. C. *Lancet*, 234:539, 1938.
41. Perla, D. *Science*, 89:132, 1939; Perla, D., and Sandberg, M. *Proc. Soc. Exper. Biol. & Med.*, 41:522, 1939.
42. Sure, B. *J. Nutrition*, 18:187, 1939.
43. Frazier, W. D., and Ravdin, I. S. *Surgery*, 4:680, 1938.
44. Steinberg, C. L. *Am. J. Digest. Dis. & Nutrition*, 5:680, 1938.
45. Stern, E. L. *Am. J. Surg.*, 39:495, 1938.
46. Stevenson, D. *Practitioner*, 140:301, 1938.
47. Cheney, G. *Am. J. Digest. Dis. & Nutrition*, 6:161, 1939.
48. Spies, T. D., Vilter, R. W., and Ashe, W. F. *J.A.M.A.*, 113:931, 1939.
49. Strauss, M. B. *J. Am. Dietet. A.*, 15:231, 1939.

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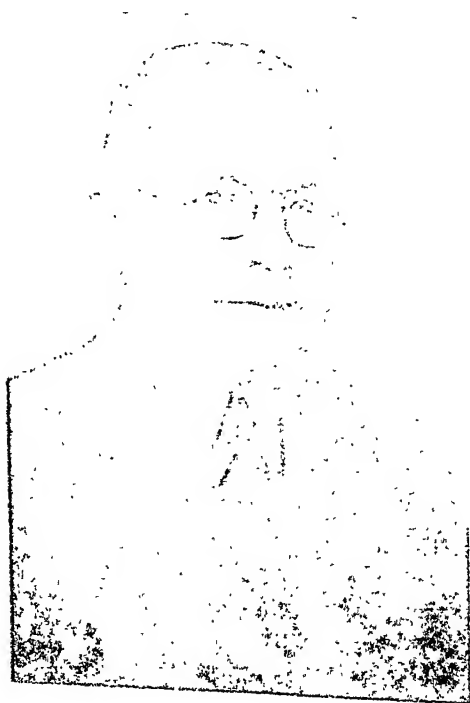
WALLER S. LEATHERS, M.D., LL.D.

DR. W. S. LEATHERS was made President-Elect of the American Public Health Association at the Pittsburgh meeting in October. At this time, Dr. Edward S. Godfrey, New York State Health Commissioner, became President, and Dr. Abel Wolman, Professor of Sanitary Engineering, Johns Hopkins University, retired as President and was elected Chairman of the Executive Board.

Dr. Leathers was born in Charlottesville, Va. He received his M.A. and M.D. degrees at the University of Virginia; was a student at Johns Hopkins University; did graduate work at Harvard and the University of Chicago; did special research work at the biological laboratories of Woods Hole, Mass., and Cold Spring, N. Y. In 1924 he was awarded the degree of Doctor of Laws by the University of Mississippi, and in 1937 a similar degree from Tulane University.

After serving as Professor of Biology at the University of South Carolina, 1897-1899, he was called to the chair of Zoölogy of the University of Mississippi, where he later was in charge of the Department of Physiology and Hygiene, and in 1904 was made Dean of the Medical Department of the University, which department he organized.

He became Director of Public Health of the State of Mississippi in 1910, and served for 7 years as Director, and 7 years as Secretary and Executive Officer of the State Board of Health. It was Dr. Leathers who brought the health work of the State of Mississippi from obscurity to the point where it



Waller S. Leathers, M.D., LL.D.

attracted not only national attention but the notice of many foreign countries.

In 1924 Dr. Leathers resigned from the Mississippi State Board of Health to accept the position of Professor of Preventive Medicine and Public Health in the School of Medicine of Vanderbilt University, Nashville, Tenn., and in 1928 was made Dean of the School of Medicine, in which capacity he still serves.

Among others, Dr. Leathers is a member of the following societies: American Medical Association, Society of Medical Officers of Health of England, Society of Tropical Medicine, Southern Medical Association, and the American Association for the Advancement of Science. He has been a member of the A.P.H.A. since 1910, is a Charter Fellow and a Life Member, was Chairman of the Committee on Professional Education 1932-1939, and served as a member of the Governing Council 1927-1930, and 1930-1933.

HENRY E. YOUNG, M.D.

WITH the passing of Dr. Young on October 24, 1939, in the 73rd year of his age, the American continent has lost one of its pioneer leaders in public health. We purposely speak of the American continent, for while Dr. Young was a Canadian and his work was done primarily in and for that Dominion, he was one of those rare characters who belong to the world at large and especially to that continent on which he lived and to the betterment of which his activities were largely devoted. While we have enjoyed the fellowship of many of Canada's leaders in public health as members of our Association, Dr. Young, in many ways, came a little closer to us than some others, possibly through his connection with the Western Branch of our Association in which he took a great interest and of which he was President-elect in 1936, when many of us were the recipients of his delightful hospitality at Vancouver and Victoria at a joint meeting of the Canadian Public Health Association and the Western Branch of the A.P.H.A. The occasion was made especially memorable by the presentation of a gavel to the Western Branch, made from the timbers of the S. S. "Beaver," a ship built in 1834 in England, and which for 53 years played a large part in the maritime development of the Northwest Pacific.¹

Dr. Young for 12 years was a Conservative legislator and for 23 years a public servant under six Prime Ministers. During this time he instituted many reforms in the health service of the province. He had a remarkable capacity for organization, the beneficial results of which were always noticeable and especially so during the influenza epidemic in British Columbia in 1918.

One of his great objectives was always the establishment of a University in British Columbia, which was achieved during his lifetime and in which he maintained his active interest to the last. Dr. Young's position in British Columbia was unique in that his services covered three decades during which the governmental attitude toward health and education changed from that of passive direction to active assistance and control, and it is not too much to say that his influence was largely responsible for this change. He was recognized as the dean of public health officers in the Dominion of Canada.

He was always a leader. A brilliant scholastic record at Queen's University and McGill was followed by postgraduate studies at the University of Pennsyl-

vania and in England. Honorary degrees were given him by many universities, including Toronto, McGill, and the University of British Columbia.

Among the offices he held were the Chairmanship and later a Life Member of the Canadian Public Health Association, the Presidency of the State and Provincial Health Authorities of North America, Presidency of the Western Branch of the A.P.H.A. He became a member of the A.P.H.A. in 1916, a Charter Fellow in 1922, and an Honorary Fellow in 1932. He was a member of the National Committee for Mental Hygiene and the American Child Hygiene Association, member of the Honorary Advisory Committee of the Connaught Laboratories, Honorary Vice-President of the St. John Ambulance Association, a Fellow of the Royal Society on Tropical Diseases, a member of the Advisory Council of the Dominion Ministry of Health, an Honorary Fellow of the British Columbia Academy of Science, and member of the Board of Governors of the Canadian Welfare Association.

With his accomplishments as a scientific man and a health officer, he combined a delightful personality, most helpful to the younger men who had the good fortune to be associated with him or to serve under him. It is hardly too much to say that he leaves as many devoted friends and admirers on this side of the border as may be found in Canada, though the people of British Columbia, especially, had the rare privilege of constant association with him year in and year out. Among the great men of whom Canada is justly proud, no one has ranked higher than Dr. Young, and none has commanded greater personal affection and loyalty than he.

REFERENCE

1. *A.J.P.H.*, Sept., 1936, pp. 954-955.

THE NEWER VENEREAL DISEASES

WHILE Lymphogranuloma venereum (Lymphogranuloma inguinale) and Granuloma venereum (Granuloma inguinale) doubtless have been with us for many generations it is only comparatively recently that they have been identified as clinical entities. The recognition of these conditions as specific diseases has come about largely by virtue of improved methods for the recognition of syphilis and chancroid, ulcerative diseases long known as effecting the genitalia, and by reason of the development of the Frei test for Lymphopathia venereum and the recognition of Donovan bodies in Granuloma venereum. Without unduly emphasizing the specificity of either of those tests in the diagnosis of the respective diseases, and readily acknowledging the sources of error in either of them, it still must be recognized that often they gave valuable aid in classifying clinical conditions. Health officers concerned with populations which include large numbers of Negroes recognize the great importance of these two diseases as causes of prolonged disability and consequently of great economic loss to the community. It is by no means uncommon for either condition to require months, and even years, of hospitalization at public expense. Our present knowledge of these diseases is just about what our knowledge of syphilis was at the beginning of this century.

The success of efforts to control syphilis is the direct outgrowth of the work of Schaudinn and Hoffman, of Wassermann, and of Ehrlich. Until we have knowl-

edge of the newer venereal diseases comparable to that provided by the investigators mentioned in respect to syphilis we cannot expect much success in attempts to prevent and treat them. Now that our knowledge gained by research has put us in such an enviable position with respect to syphilis as to lead to prospects of speedy success of control measures, let us hope that investigators will devote more attention to these predominantly venereal conditions about which we know so little. Perhaps it would not be expecting too much to desire to see some of the resources in money and energy now going into problems related to syphilis turned into the channels of study of the newer venereal diseases. Such problems as sources of infection, modes of transmission, prophylaxis, and therapeutics all await further study.

A TRIBUTE TO DR. LIVINGSTON FARRAND WHO DIED NOVEMBER 8, 1939

THE Chemin des Dame in 1919 was a strange place in which to develop a friendship. That is where Dr. Farrand and I first had three uninterrupted days together, travelling along the entire Western Front and exploring its devastation. Prior to that our contacts had been in the busy line of duty and our conversations brief. Our voyage together was his first moment of relaxation during or since the World War. Freed momentarily from crushing responsibilities he reacted like a schoolboy and with tireless curiosity darted into dug-outs, examined the remnants of postes de secours, studied maps in an effort to locate vanished villages, slept and ate in the ruins of shattered estaminets, maintaining the while a running fire of keenest question and comment. Now and then on a bit of rising ground he paused in silence, his pitying eyes sweeping that terrain of utter desolation, his great heart suffering at the limitless human tragedy there displayed.

In the twenty years since, during which he has filled many rôles with high distinction, I have always seen him as I knew him then, a boy in spirit, a man in understanding, an alert scholar, a friend of his fellow men. The many sides of his personality were so nicely balanced and so blended with warm human sympathy as to kindle an answering spark of friendship in all his associates.

Life was not ungenerous to Dr. Farrand in its allotment of years. Yet his ceaseless energy and the youthful clarity of his thinking erased from our minds any thought that he was growing old. He had a rare capacity for playing the part of a contemporary with whomever he conferred. That quality endeared him to young and old alike and will abide as a lasting inspiration in the memory of his countless friends.

KENDALL EMERSON

BOOKS AND REPORTS

Man Against Microbe—By Joseph W. Bigger, M.D. New York: Macmillan, 1939. 304 pp. Price, \$2.50.

The writer, who has already established for himself an enviable position as an author of textbooks, now writes for the general public on a subject in which everyone is of necessity interested and which he believes has too long been regarded as a matter only for specialists. He considers microbiology as an educational and cultural subject just as worthy of study as any of the other basic sciences, or even "politics and finance."

One might almost say that the book is dedicated to Antony van Leeuwenhoek, who first saw what we now call bacteria, as it begins with an "Introduction" to him and ends with a tribute to him as "one of the world's few really great men."

The book is orderly arranged in three sections, one giving the meaning of microbiology, the second the history of microbiology, and the third the relation of microbiology to mankind. It is written in simple language and good English which holds the attention of the reader. It is a fascinating story which can be recommended to all laymen whatever their calling.

We have found only one factual error. The author states that Reed, Carroll, Lazear, and Agramonte lived in a well screened hut, using the clothing and bedding, even soiled with the vomit and excreta of those who had died of yellow fever, yet escaped. While the experiment was done under the direction of the American Commission, the man who actually volunteered for this service were Dr. Robert P. Cooke, of

Richmond, Va., Acting Assistant Surgeon, and Privates Levi E. Folk and Warren J. Jernigan. These men deserve all the credit for their heroism and the Commission which planned the experiment gave it to them.

The book is well illustrated with 18 plates and 17 cuts. The plates without exception are good and many of the cuts also. The binding and make-up are excellent.

It is a good book for all public libraries. MAZÏCK P. RAVENEL

Silicosis and Asbestosis—By various authors. Edited by A. J. Lanza, M.D. New York: Oxford University Press, 1938. 439 pp. Price, \$4.25.

Silicosis and asbestosis, diseases quite frequently encountered among workers in certain dusty trades are today regarded as being of real public health significance. Upward of 500,000 workers in the United States are exposed to silica dust to a harmful degree. The present book, representing the joint efforts of 4 American and 2 British experts in this field, is most timely.

Here is summarized the knowledge of both silicosis and asbestosis. The pattern followed conveys the fundamental information in condensed and direct fashion under (1) history, (2) etiology, symptomatology and diagnosis, (3) X-ray diagnosis, (4) pathology, (5) experimental pathology, (6) occupational preventive and legislative aspects in Great Britain, and finally (7) public health and economic aspects in the United States.

In the section devoted to X-ray diagnosis a similar type of tabulation presents the X-ray and histological

appearances in the healthy lung, in simple silicosis, and in silicosis with infection. A discussion of Roentgen Technic includes consideration of time of exposure, focal-spot film distances, type of screens, desired voltage, choice of current, type of tube and the processing of films, measurement of patients, and stereoscopic examinations. This section is very complete and well illustrated.

The sections on pathology (by R. S. Gloyne), and experimental pathology (by L. U. Gardner), taken together present a complete picture of the nature of the damage done by silica dust in man and animals and also a dynamic view of the effect of other dusts on the lungs when mixed with silica dust. This latter portion provides an excellent basis for an appreciation of the effects of various mixed dusts, which constitute a most important medical and compensation problem.

That the incidence of silicosis varies from industry to industry is borne out by a table showing the number of deaths from this disease in Great Britain from 1930 to 1936, the average being 325 deaths per year. This does not represent the true number since many cases are not diagnosed, and while many men have the disease they die from other causes. The nature of the industry, the nature of the dust (its content of free silica), size distribution of dust, concentration, and other factors play determining rôles. Dr. Middleton discusses these points with respect to many different occupations and also prevention and compensation. The British schemes for compensation are well presented.

Dr. Lanza in the final chapter on public health and economic aspects presents the American compensation schemes for silicosis, and a brief discussion of the fundamentals of medical and engineering prevention of silicosis.

LEONARD GREENBURG

The Administration of High School Athletics—By Charles E. Forsythe. New York: Prentice-Hall, 1939. 413 pp. Price, \$2.00.

There is great need of texts written by people with practical experience. This is peculiarly true in the field of education. One of the great weaknesses in education—possibly the greatest—is that so much of our program is instigated by theorists who lack intensive practical experience.

Therefore this text is especially welcome. Written by one who is actually administering interscholastic athletic competition at the high school level, it has a practical point of view.

It is devoted to that special phase of physical education which is called athletics and is applied largely to interscholastic athletic competition. Starting with the history and objectives of such competition, it speaks of the National Federation of State High School Athletic Associations, and of State High School Associations, then discusses regulations controlling eligibility and contests. It discusses policy and administration for local programs, for contest management, and goes on to speak of equipment, awards, finances, and budgets. It discusses the very important basic element of safety and sanitation in athletics, and those things which have so much to do with safety, namely: the facilities for athletics. There is a chapter on intramural athletics which, after all, is the foundation on which a true interscholastic program should be built. It also mentions athletics for girls. The brief discussion of junior high school athletics is not emphasized as much as the reviewer could wish. Great danger rests in interscholastic competition at that age level, where chances of strain and injury are so great.

This text has a great deal of practical information valuable to those who, either from the health viewpoint or

from that of education, have to do with administration at the secondary school level. This is the sort of text that is badly needed in the field of secondary school physical education.

CHARLES H. KEENE

A Girl Grows Up—By *Ruth Fedder*. New York: McGraw-Hill, 1939. 235 pp. Price, \$1.75.

Broad in scope and effectively written, this book meets the test of capturing the interest of the reviewer's 13 year old daughter as well as of other members of the family. Problems of 'teen-age girls and adjustments to be made in growing up—involving decisions in getting along with parents, boys, the world, and themselves—are examined and interpreted in the light of the author's years of experience while working with girls. A useful feature is a list of books you may want to read.

IRA V. HISCOCK

Pulmonary Tuberculosis: A Synopsis—By *Jacob Scgal, M.D.* Oxford University Press, 1939. 150 pp. Price, \$2.75.

This book tells the story of tuberculosis in synoptic form. It is concise and replete with well annotated cuts of roentgenograms illustrating cases taken from the author's own experience. The volume is in 7 divisions, each of which is designed to emphasize the latest advances and most modern concepts in treatment and prevention.

Under General Considerations the author defines pulmonary tuberculosis, describes the sources of infection, modes of spread, and, in simple language, the pathogenesis and pathology of tuberculosis. The second chapter is devoted to a description of the various clinical types of tuberculosis and is illustrated with 3 diagrams showing, respectively, the normal lungs, the active primary complex, and the healed primary complex, followed by

7 very fine reproductions of roentgenograms.

There are chapters on Symptomatology, Complications and Accidents in Pulmonary Tuberculosis, and Diagnosis. The section on Treatment takes up the greater part of the book and is illustrated by 28 reproductions of roentgenograms. In this the author discusses all types of treatment: hygienic régime, medicinal, chemical, physical, biological, surgical, and psychic. The last chapter is devoted to Prevention.

The foreword written by the late Dr. Coryllos states:

It is a truism to say that the education of doctors and students in pulmonary tuberculosis has been neglected in the past and, unfortunately, is being neglected at the present. Patients with pulmonary tuberculosis had been considered as patients to get rid of by sending them away to the country or to sanatoria. But today, our conceptions on the management of the disease have completely changed. Collapse treatment, either by pneumothorax or by more drastic surgical procedures, has transformed this disease into a medico-surgical problem whose solution can be successfully carried out everywhere by the coöperation of the phthisiologist and the thoracic surgeon. However, the fate of the tuberculous patient remains in the hands of the practitioner and depends on his knowledge of the disease and his timely diagnosis.

The publishers are to be commended for the manner in which the roentgenograms are reproduced, one on a page. This increases the size of the book, but adds greatly to its appearance and is attention compelling. The listing of illustrations is descriptive and well conceived. An index is provided. The printing and make-up are good.

The volume is recommended for physicians, medical students, nurses, and health workers. It is a companion to the more elaborate and more detailed texts on pulmonary tuberculosis. It will be welcomed by the profession as a "refresher" textbook.

BERNARD S. COLEMAN

Books and Babies — By Garry Cleveland Myers and Clarence Wesley Sumner. Chicago: McClurg, 1938. 116 pp. Price, \$1.75.

A rare combination of child psychology and intimate knowledge of books suited to the varied ages and interests of young children has gone into the making of this book. The distinguished child psychologist, Dr. Myers, and Mr. Sumner, librarian and founder of the Mothers' Room of the Youngstown Public Library, have written a most interesting and instructive account of the part that the reading of books to children from 2 to 10 may play in the intellectual and emotional development of both the children and their parents.

Services that can be rendered by the library are clearly indicated, though artfully woven into brief accounts of the experiences of the librarian and the parents and children seeking knowledge and adventure in the realm of books.

The book is offered as a "joint effort in behalf of young children and their parents." It affords 2 hours of pleasant, informative reading with many excellent practical suggestions on the guidance and mental growth of the child; and points the way to further values in its field by its many pertinent references to other literature and by a carefully selected bibliography of books and magazines.

FREDERICK W. BROWN

Public Health Law—By James A. Tobey. New York: Commonwealth Fund, 1939. 414 pp. Price, \$3.50.

Rapid expansion of public health activities, including the legal aspects of health administration, during the 13 years since the previous edition, has required considerable expansion and revision of this book, which may be safely recommended for the active use of anyone engaged in public health,

whether administrator, educator, lawyer, or sanitary officer. This modern work on a basic subject reflects the author's wide experience and extensive study, it is written in an interesting style, fully documented, and well printed.

This book is more comprehensive and better arranged than the earlier edition and is the outstanding text in this field. Answers, based on court decisions, are given to many questions. The 21 chapters, supplemented with many references, deal with the law and administration, powers and duties of health departments, liability, legislation, and law enforcement.

IRA V. HISCOCK

Fundamentals of Physical Examination—By George G. Deaver, M.D., B.P.E. Philadelphia: Saunders, 1939. 299 pp. Price, \$2.75.

This book is designed primarily as a textbook or manual for medical students, public health nurses, and physical educators. It is set up with due regard to pedagogical principles with lessons to be written, laboratory work to be carried out, and self-tests at the end of each chapter. The material is laid out systematically with chapters devoted to the special senses and systems of the body with a minimum of words and a goodly number of illustrations. Normal structure and function are described briefly in conjunction with departures from normal. It is encouraging to note that in the chapters on "The Eyes" and "The Ears," the uses of the ophthalmic telebinocular and the audiometer are recommended especially as "screening" instruments in testing school children. It is questionable, however, whether this book should be placed in the hands of physical educators and nurses with the implication that it will equip them to diagnose or treat many of the pathological conditions which are described.

RICHARD A. BOLT

Nutrition and Physical Degeneration: A Comparison of Primitive and Modern Diets and Their Effects—By *Weston A. Price, M.S., D.D.S.* New York: Hoeber, 1939. 431 pp. Price, \$5.00.

This most interesting book is the outcome of study by the author undertaken primarily to determine the cause of dental caries. To this extent the title does not give a fair idea of the compass of the book. The author's thesis may be summed up in the statement that the cause of tooth decay "is controlled directly by nutrition"; that civilization has been anything but a blessing to mankind, and that many primitive racial stocks even in the first generation after the adoption of the modernized diet, and while the blood is still pure, have shown degenerative processes quite like those which characterize America and Europe. He goes further in holding that changes take place in the facial and dental arches, and indeed that accompanying these changes there are many other deteriorative changes in personality and in physical and mental characteristics. He feels that his work is of direct interest to medicine and dentistry as well as to the social organizations concerned with the betterment of racial stock.

His travels have been world-wide. The groups investigated represent a fairly complete cross-section of the racial stocks of the world, Swiss, Gaelics, Eskimos, Canadian and Florida Indians, Africans, South Sea Islanders, Australian Aborigines, Malay tribes, Maori of New Zealand, and South Americans of the Amazon basin and the ancient civilizations of the west coast of that country. Chemical analyses of the foods of some of the isolated groups as well as of those which have displaced them in the process of civilization were made.

The author recognizes that the application of his findings and his con-

clusions are not orthodox, but since our orthodox theories have not saved us it may be necessary to readjust them to bring them into harmony with Nature's laws.

The Foreword by Professor Hooton has a pertinent suggestion along this same line—Why have we been so "stupid" as to concentrate our attention upon finding out why our teeth are so poor and never trying to learn why the teeth of primitive races are good?

The book is a rather remarkable study which covers the primitive racial stocks, both isolated and modernized, of almost every part of the world. Quoting the statement that a good illustration is equivalent to a thousand words, the author gives 6 maps and 134 illustrations, reproductions of excellent photographs. Many of these show comparative pictures of Aborigines who have not yet come into contact with civilization, with the same people who have been "civilized."

No one can doubt the accuracy of Dr. Price's observations or the careful study that he has given to them. His interpretations are open to more criticism but it does seem to be a fact that practically every primitive race which has been studied is largely free from the dental disturbances which affect practically everyone in the so-called civilized countries.

There are some statements which are inexact. For example, the required intake of phosphorus is given differently in different parts of the book—the last amount, 2.64 grams, being high. The amount of iron also is high. On page 265 we are told that the guinea pig is probably the most efficient of animals in synthesizing vitamin D from plant foods. The statement that chlorophyll is the precursor of vitamin A does not seem to be substantiated. We are told also that diabetes is prevented as well as cured by the extract of a plant found in British Columbia.

Other statements require substantiation, and one gathers the impression that the author has accepted some stories as facts without proper verification.

The book goes far to establish what many have already believed—that defective nutrition is the cause of deficiencies which lead to tooth decay as well as to other ills of the human body, of which caries is only one evidence. Whether this is due to deficiency in one substance or several is not known. Instead of putting the blame for caries on one particular type of food, such as carbohydrates, the author believes that we should lay more stress on the lack of some factor, the presence of which is necessary to prevent the untoward action which we now believe to be the cause of caries. He has compiled an impressive volume of evidence to support his contention. The criticisms as to certain facts do not overthrow the mass of evidence that he has collected showing the relation between faulty nutrition and faulty teeth. While the book is very interesting, we consider it also a most important contribution to the understanding of its primary object; namely, the determination of the cause of dental caries. The make-up and printing are excellent.

C. F. ELZEA

Nursery School Education—By Josephine C. Foster, Ph.D., and Marion L. Mattson, Ph.D. New York: Appleton-Century, 1939. 361 pp. Price, \$2.50.

For those who wish information themselves on the subject of the nursery school, or for persons such as doctors, nurses, social workers, or teachers who need to instruct others, scarcely a book could be found with more helpful specific information and suggestions. It is written from a scientific point of view, yet is most practical because backed by years of actual

experience which the authors have spent working in the field of nursery school education.

Usually those who question the value of nursery schools do not know what, as the editor says, "should happen to children who live in a well managed nursery school." In simple, readable language which the lay person can easily understand such subjects as the following are discussed: What is a nursery school? Of what value is nursery school experience for children? What are its objectives? What equipment, what specific methods and technics are considered by authorities in the field of child study as best to use with young children?

The book contains a fine list of references on the subject, as well as many excellent pictures of the activities of young children as found in good nursery schools. It is a splendid source book.

ETHEL GORDON

Handbook on Tuberculosis for Public Health Nurses—By Violet H. Hodgson, R.N. New York: National Tuberculosis Association, 1939. 92 pp. Price, \$.50.

Nurses everywhere will appreciate this compact volume on tuberculosis. The author has drawn on expert opinion in the field and, with a personal background of experience in matters pertaining to tuberculosis nursing, especially from the public health viewpoint, presents information that should be part of the stock-in-trade of every public health nurse.

In addition to chapters of general information about tuberculosis and community relationship, the sections on procedure and technics are preceded by A Concept of Tuberculosis Nursing, which strikes the keynote of relative values in adequate and proper tuberculosis nursing, whether in a generalized or specialized program.

Technics and procedures are de-

scribed succinctly in the sections on Case-Finding, Home Visiting, Nursing Supervision—When and How Long, Substitutes for Home Visiting, Nursing Records, Chest Clinics, What to Teach the Patient and the Family, and Hospital Regimen in the Home. Responsibilities are defined clearly throughout the manual. Attention is also given in respective chapters to the nurse's part in securing hospital care for the patient and the importance of being able to interpret satisfactorily to the patient and family the significance of collapse therapy when indicated. A chapter on Appraisal of the Nursing Service concludes the manual.

The handbook is a worthy successor to Mrs. Hodgson's earlier *Tuberculosis Nursing for Public Health Nurses* and the more detailed manual she produced for the New York State Department of Health. It is very well written and deserves a place in the kit of every public health nurse. It is also valuable for teaching purposes.

BERNARD S. COLEMAN

Health Facts for College Students
—By *Maudc Lee Ethcridge, M.D., Dr.P.H.* (3rd ed.) Philadelphia: Saunders, 1939. 410 pp., 65 ill. Price, \$2.00.

This third edition of *Health Facts* follows the same general plan as the earlier ones, but it has been lengthened somewhat. It deals primarily with problems of personal hygiene. Three chapters are devoted specially to public health practices, namely "Water Supply and Sewage Disposal: Their Relation to Disease," "Diseases Conveyed by Insects," and "Supervision of Public Health." There is a chapter on communicable diseases, and various references to public health problems are found in other parts of the book.

The book aims to present a brief and simple statement of essential health facts. It is written for the most part

in short, simple sentences and avoids technical detail. The reader would enjoy an improvement in the quality of the illustrations. C. E. TURNER

The Newer Knowledge of Nutrition—By *E. V. McCollum, Ph.D., Sc.D., LL.D., Elsa Orent-Keiles, Sc.D., and Harry G. Day, Sc.D.* (5th ed.) New York: Macmillan, 1939. 701 pp. Price, \$4.50.

Twenty-one years have passed since the first edition of *The Newer Knowledge of Nutrition*, and 10 years since the fourth edition appeared, written in collaboration with the present reviewer. In the meantime the field of nutrition has become an indispensable ally of the dentist and the physician, and a potent factor in public health endeavor. Tremendous strides have occurred in studies of the fundamentals of nutrition as well as the ascertainment of requirements for specific nutrients in health and disease. This extended scope of nutrition has required skill in organization and composition, as well as a masterly understanding of the literature, to produce a book which aims, as stated in the preface, to make "... a concise survey of the field of nutrition, which is more extensive and more inclusive than any other now available..." There is no doubt that the authors have accomplished their objective, and in a simple, attractive style which encourages absorbing interest in the subject.

The first two chapters orient the reader, since they are essentially historical, and trace the development of modern concepts of nutrition. Each of its succeeding 25 chapters is concluded with a list of selected references. An appendix gives tables on the nutritional value of foods as respects vitamins and proteins. The effects of various dietary deficiencies are illustrated.

The authors have presented the

present knowledge of nutrition in a comprehensive manner, including both fundamentals and applications; and there is no doubt that their hope will be realized "... that the book will meet the needs of all who are ... seeking to determine what is sound and what is misinformation in respect to the nutritive needs of the several species including man ... and the means of dealing effectively with these nutritional problems." The book will be a valuable aid not only to nutritionists but to all persons interested in public health. NINA SIMMONDS

Physical Education in the Elementary Grades—By *Strong Hinman*. New York: Prentice-Hall, 1939. 523 pp. Price, \$2.00.

More and more books on physical education are acknowledging the importance of health education. This text is one that indicates that more than just big muscle activity needs to be considered in physical education programs. The author includes what is generally accepted to be the model for school health services. The opening chapters, which deal with the relationships between physical and health education and a modern program of health and physical education, state well what makes up a modern program in the elementary school grades. Inexperienced teachers of physical education would find a great deal of help from such topics as integration and program planning.

More than ordinary thought has been given to including a weekly lesson on health education. However, since the book is primarily a handbook of activities for the elementary grades, one is rather disappointed in not finding more material for the actual integration of health with the physical education program.

The handbook material is nicely divided into story plays, plays set to

music and rhythm for the early grades. Rhythmical activities, folk dances, relays, and athletic games of low organization are carefully graded for the higher elementary years. The final chapters are devoted to conditioning and corrective exercises. Athletic badge tests, and stunts in self-testing activities provide a great deal of material that adds variety and spice to a good physical education program.

D. B. TREAT

The Biology of Bacteria: An Introduction to General Microbiology—By *Arthur T. Henrici, M.D.* (2nd ed.) New York: Heath, 1939. 494 pp. Price, \$3.60.

One is pleased to see a second edition of a book of this informative kind. It indicates that a particular need for such a text is being satisfied and that the subject has progressed sufficiently to justify revision. This edition continues the same interesting and accurate presentation of material which was characteristic of the earlier one, omitting some sections and adding others, as indicated by the development of newer knowledge, such as the work of Karström on constitutive and adaptive enzymes, and the use of sulfanilamide in the treatment of bacterial infections.

Two new chapters on ecology have been added, the first dealing with the effect of environmental factors on bacteria, and the second with the distribution of bacteria in soil, water, milk, and the human body. A summary of Knight's grouping of bacteria on the basis of nutrient requirements and a short discussion of the rapidly developing and increasingly important subject of accessory growth-promoting substances for bacteria has been included in the first of these chapters. Although no attempt has been made to have this include much of the more recent information on the subject, it

should serve to arouse in the student an interest in this fundamental aspect of bacteriology.

The author is to be commended for having presented the subject matter of bacteriology in an interesting manner and in such a way as to emphasize properly the subject as a fundamental biological science, a knowledge of which is so necessary to the intelligent study of its applications. One might hope that, for the future development of bacteriology, such a book would come to the attention of college administrators who still think only of the applications of bacteriology, rather than of the subject as a fundamental biological science.

The volume has been increased in size by 22 pages and has the excellent illustrations and make-up of the first edition. The nomenclature and classification used is in accord with the recent fifth edition of *Bergey's Manual*.

NEWELL R. ZIEGLER

A College Course in Hygiene—
By K. Frances Scott, M.D. New York: Macmillan, 1939. 202 pp. Price, \$2.50.

A reviewer approaches this work with kindly feelings since there is no jacket filled with "blurb" and no letter of recommendation by some supposed authority. "Good wine needs no bush."

For convenience the treatment is in two sections, personal and group hygiene, approximately two-thirds and one-third respectively, each introduced by a "Foreword." The author holds correctly that while the problems of everyday living involve the "entire alphabet of sciences, from agriculture to zoölogy," understanding of the body is fundamental, so the first part gives its structure, functioning, and pathology, while the second considers the emotions and intellect, inheritance, group customs, all the environmental

factors which influence health and measures which may be taken to improve these.

The text is clearly and interestingly written and factually in accord with our knowledge. Most basic topics have sections on the "disorders" and "hygiene" of the organs or functions described which are expected to be supplemented by lectures, discussions, and readings. Suggested readings at the end of chapters are too numerous and many beyond the understanding of the average college student.

The author is Associate Professor of Hygiene at Smith College and the book is addressed to girls. Students are referred to in the text as "she" and "her" though there is good material for men also. Sex is discussed without hesitation in plain language, which is in accord with present ideas.

There is an adequate index. Bound in at the back are 14 leaves called "Workbook," perforated for tearing out and also for loose-leaf binding. The binding is "ring" so that the book lies flat when opened. The printing is clear and the illustrations are well selected. The author has produced a balanced and useful text which can be recommended. MAŽYCK P. RAVENEL

Oh, Doctor! My Feet!—By Dudley J. Morton. New York: Appleton-Century, 1939. 116 pp. Price, \$1.50.

The author of the scholarly and important textbook, *The Human Foot*, has now undertaken to write in a popular vein on foot ailments. His announced purpose of starting people to thinking and talking about their painful and uncomfortable feet is most commendable. There is great need that the public appreciate the importance of comfortably functioning feet, and that foot sufferers learn that ailing feet deserve professional care just as much as any other part of the body.

All the points made are true and important, but are perhaps too technical to be digested by the average individual, unacquainted with the evolution, anatomy, and physiology of the human foot. The material would seem to be over the heads of those whom Dr. Morton is striving to inform and so loses a great part of its educational value.

Dr. Morton stresses the importance of X-ray examination in the diagnosis of foot disorders, and rightly so, but this importance seems overemphasized in a book of this character. The purpose is to encourage the foot sufferer to seek competent advice for relief of his difficulties. Today practically every large store is equipped with an X-ray machine, which is used to demonstrate the fit of the shoe. When we realize how disposed the layman is to believe that an X-ray reveals all that is to be known of his condition, it can readily be seen that many may be misled into thinking that as their feet have been X-rayed by the shoe salesman, he knows all about their foot difficulties, when, in fact, such X-rays reveal nothing except the position of the foot in the shoe. The public has yet to learn that it is not the X-ray shadows which are important, but the interpretation of these shadows.

That section of the book which deals with shoes is excellent. The fallacy of accepting every so-called "orthopaedic shoe" at its face value is clearly shown, and easily understandable suggestions for the selection of a proper type of shoe are given. The chapter devoted to footwear gives a clear guide to the proper clothing of the foot.

While Dr. Morton's contention that all foot discomfort is traceable to "a lazy first metatarsal bone," and all that is necessary for the relief of foot discomfort is that this lazy beggar be made to do its share of the work is open to question, he is to be commended

for his effort to make the public foot-conscious, and for the dignified way in which he has handled a subject which mass lay advertising has made almost a by-word. *Oh, Doctor! My Feet!* can be read with profit by the public, particularly by the parents of growing children, as it will give them much information regarding a very important and much abused part of the body. It may be added that it would make excellent reading for most physicians as well.

FRANK D. DICKSON

Text-Book of Meat Hygiene: With Special Consideration of Antemortem and Postmortem Inspection of Food-Producing Animals--By *Richard Edelmann, Ph.D. (7th ed. by John R. Mohler and Adolph Eichhorn.) Philadelphia: Lea & Febiger, 1939. 463 pp. Price, \$5.50.*

This book has been before the public for a number of years and with the first edition took its place as a standard. The demand for a seventh edition is an index of its value. This revised edition has been brought up to date by changes which make it conform with our most recent knowledge of a pathological conditions which might render meat unfit for consumption.

A new section dealing with the ductless glands has been added, since the hormones extracted from the glands of animals are now being extensively used in the treatment of some conditions of the human body. The Federal Meat Inspection of the United States (Chapter IV) is believed to be the most complete in the world; hence, the editors have incorporated all additions and amendments made to the regulations since the previous edition of this book. For the same reason certain equipment which was figured in the original German publication has been replaced by cuts and descriptions of American apparatus, since the designs are in advance of those formerly used. This particular

apparatus is in use for rendering both the edible and inedible portions of carcasses of animals.

The book is abundantly illustrated and the make-up and printing are excellent. One can say with certainty

that this edition will maintain the high place established by previous ones. As a practical guide as well as reference it can be recommended without reservation.

MAZÛCK P. RAVENEL

BOOKS RECEIVED

- PATHOGENIC MICROORGANISMS.** By William Hallock Park and Anna Wessels Williams. 11th ed. Philadelphia: Lea & Febiger, 1939. 1056 pp. Price, \$8.00.
- HANDBOOK OF BACTERIOLOGY FOR STUDENTS AND PRACTITIONERS OF MEDICINE.** By Joseph W. Bigger. 5th ed. Baltimore: Williams & Wilkins, 1939. 466 pp. Price, \$4.25.
- THE DYSENTERIC DISORDERS.** By Philip Manson-Bahr. Baltimore: Williams & Wilkins, 1939. 613 pp. Price, \$8.00.
- HISTORY OF TROPICAL MEDICINE.** Based on the Fitzpatrick Lectures. By Harold Scott. Baltimore: Williams & Wilkins, 1939. In Two Volumes. Price, \$12.50.
- BACK TO SELF-RELIANCE.** By Matthew N. Chapell. New York: McGraw-Hill, 1939. 239 pp. Price, \$2.00.
- HEALTH FOR NEW YORK CITY'S MILLIONS.** Annual Report of the Department of Health of the City of New York for the year ending December 31, 1938. New York: Department of Health, 1939. 295 pp.
- STEDMAN'S MEDICAL DICTIONARY, ILLUSTRATED.** By Thomas Lathrop Stedman and Stanley Thomas Garber. 14th rev. ed. Baltimore: Williams & Wilkins, 1939. 1303 pp. Price, \$7.50.
- INTRODUCTION TO MOTHERHOOD.** By Edwin F. Patton. South Pasadena: Commercial Textbook Co., Ltd., 1938. 137 pp. Price, \$1.50.
- PRECLINICAL MEDICINE.** Preclinical States and Prevention of Disease. By Malford W. Thewlis. Baltimore: Williams & Wilkins, 1939. 223 pp. Price, \$3.00.
- THE SANITARY INSPECTOR'S HANDBOOK.** A Manual for Sanitary Inspectors and other Public Health Officers. By Henry H. Clay. 4th ed., enl. and ill. London: H. K. Lewis & Co., Ltd., 1939. 528 pp. Price, \$5.25.
- OPHTHALMOLOGY.** By Burton Chance. New York: Hoeber, 1939. 240 pp. Price, \$2.00.
- PEDIATRICS AND PEDIATRIC NURSING.** By A. Graeme Mitchell, Echo K. Upham and Elgie M. Wallinger. Philadelphia: Saunders, 1939. 575 pp. Price, \$3.00.
- A TEXTBOOK OF PRACTICAL NURSING.** By Kathryn Osmond Brownell. Philadelphia: Saunders, 1939. 418 pp. Price, \$3.00.
- BACTERIOLOGY.** By William W. Ford. New York: Hoeber, 1939. 207 pp. Price, \$2.50.
- NUTRITION AND THE DIET IN HEALTH AND DISEASE.** By James S. McLester. 3rd ed. Philadelphia: Saunders, 1939. 838 pp. Price, \$8.00.
- GONORRHEA IN THE MALE AND FEMALE.** By P. S. Pelouze. 3d ed. Philadelphia: Saunders, 1939. 489 pp. Price, \$6.00.
- YOUR CHILD'S FOOD.** By Miriam E. Lowenberg. New York: McGraw-Hill, 1939. 299 pp. Price, \$2.50.
- THE CARE AND HANDLING OF MILK.** By Harold E. Ross. rev. and enl. New York: Orange Judd, 1939. 417 pp. Price, \$4.00.
- SUPERVISION IN PUBLIC HEALTH NURSING.** By Violet H. Hodgson. New York: Commonwealth, 1939. 376 pp. Price, \$2.50.
- PRINCIPLES OF HEALTHFUL LIVING.** By Edgar F. Van Buskirk. New York: Cordon, 1939. 386 pp. Price, \$2.25.
- WHY QUIT OUR OWN?—Offering an American Program for Farm and Factory.** By George N. Peek, with Samuel Crowther. New York: Van Nostrand, 1936. 353 pp. Price, \$5.00.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Vulnerable Teeth—Here in Harpers you will find an excellent article on the teeth and what ails them. The author suggests that some day some enterprising drug house will furnish us with a concentrate of all the essentials that the Eskimo gets in the raw fish and meat that seem to assure him a set of lifetime teeth. Until that blessed event occurs, the author suggests what we may do.

ALVAREZ, W. C. Why Can't We Have Perfect Teeth? Harpers No. 1073, p. 498 (Oct.), 1939.

Hazardous Benzol Fumes—Five fine papers, taking up the entire issue of this magazine as they do, must surely furnish all that health officials will need to know about the hazard of exposure to benzol vapor. This pompous conclusion is based upon a reading of the first three of the 114 fact-filled pages and a glance at the summaries of each paper.

BOWDITCH, M., *et al.* Chronic Exposure to Benzine (Benzol), I. The Industrial Aspects (and four related papers). J. Indust. Hyg. and Toxicol. 21, 8:321 (Oct.), 1939.

Much about Pneumonia—In this symposium, serotherapy, chemotherapy, and general treatment measures are reviewed in detail. Much more of the discussion than one might suppose is of immediate interest to health administrators, for good treatment has prophylactic as well as therapeutic values. So the series is respectfully commended to all health officers.

BULLOWA, J. G. M., *et al.* Serotherapy of the Pneumonias (and three related papers). J.A.M.A. 113, 15:1402 (Oct. 7), 1939.

An Inside Job of Public Relations—How the health department staff can make a real contribution to the school health program is told in practical detail based upon successful experience. In similar vein is discussed methods by which classroom teachers can be induced to take an intelligent interest in health education.

CHOPE, H. D. How Can the Health Department Contribute to the School Health Program? J. School Health. 9, 8:223 (Oct.), 1939.

You Can Make the Horse Drink Water—This prescription for sound health education—select those who can best use it, utilize most effective channels, write clearly and avoid professional lingo, take time to be brief and shun statistics and generalities, tell a good story, and apply the facts to people's problems—is propounded by one who has put it to good effect in teaching mothers and fathers about safe maternity.

CORBIN, H. Teaching the Public About Maternity. Pub. Health Nurs. 31, 11:598 (Nov.), 1939.

Helping to Picture Health Needs—A procedure is proposed by which the actual health problems or accomplishments of a community may be interpreted by a relativity scale which indicates the standing among other communities in any of several indexes.

DERRYBERRY, M. A Procedure for Putting Health Department Reports to Work. Pub. Health Rep. 54, 38:1709 (Sept. 22), 1939.

To Vaccinate or Not—Vaccination with *H. pertussis* vaccine at 6-15 months

of age did not lower the incidence of whooping cough during the following 3½ years when the immunized children were compared to a control group. The attacks may have been somewhat milder.

DOULL, J. A. Active Immunization Against Pertussis. *Am. J. Dis. Child.* 58, 4:691 (Oct.), 1939.

How to Immunize against Diphtheria—A brief but dramatic account of Ramon's discovery of anatoxine enlivens this rather detailed discussion of the prophylactic values of the various toxoids. But at the end is this whooping schedule for infant pincushions: 3-6 mos., smallpox vaccination; 6-8 mos., whooping cough; 9-12 mos., diphtheria toxoid; 18 mos., reinforcing whooping cough vaccine; 1-2 yrs., scarlet fever toxin; 2-4 yrs., reinforcing dose of toxoid; and 5-10 yrs., a repeat smallpox vaccination. At the end it is suggested that somewhere in the schedule a shot of tetanus and some typhoid fever inoculations would add to the gaiety of the child's life.

FRASER, D. T. Diphtheria Toxoid. *Canad. Pub. Health J.* 30, 10:469 (Oct.), 1939.

Historical Note—In this graphic account of the devastation resulting from an invasion of yellow fever into a quiet peaceful college community, the health publicist will find some excellent material on which to try his craftsmanship. A first-hand account of the last yellow fever epidemic is a jewel of the first water.

HERRICK, G. W. The Last Epidemic of Yellow Fever. *Sci. Month.* 49, 5:401 (Nov.), 1939.

Treatment for Early Syphilis—Massive doses of arsphenamine given on succeeding days by a continuous administration method are reported as producing immediate results and serological cures in most early cases. Warning is given that massive dose therapy

is still in an experimental, though promising, stage.

HYMAN, H. T., *et al.* Massive Dose Therapy of Early Syphilis by the Intravenous Drip Method. *J.A.M.A.* 113, 13:1208 (Sept. 23), 1939.

Counting Sheep Now Passé—What will our vitamins cure next? It seems that vitamin B and ascorbic acid may help prevent insomnia, especially in old people and alcoholics.

KARNOSH, L. J. The Treatment of Insomnia. *J.A.M.A.* 113, 14:1322 (Sept. 30), 1939.

Family Size and Income—When we glibly view-with-alarm the failure of "the best" people to produce their quota of children, we must first be sure we know what we are talking about. If we base fertility rates on *all* women, the generalization that the better off they are, the fewer the children they have, is true; but if *married* women alone are considered, there is more nearly an equality in fertility rates among those who have sufficient family incomes and those who have not.

KARPINOS, B. D., and KISER, C. V. The Differential Fertility and Potential Rates of Growth of Various Income and Educational Classes of Urban Populations in the United States. *Milbank Quart.* 17, 4:367 (Oct.), 1939.

More about Pneumonia—Here in a half dozen pages is set forth all that health workers generally will need to know about the newer methods for the treatment of pneumonia. They will learn that chemotherapy, as effective as it has proved to be, does not relieve them from their educational responsibilities. Pneumonia, the public must be told constantly, is still a medical emergency that needs prompt and immediate care; typing is still vitally important, so laboratory services must be maintained for, in appropriate cases, serum therapy should be combined with chemotherapy.

LORD, F. T. Chemotherapy and Sero-therapy of Pneumonia. *New Eng. J. Med.* 221, 15:570 (Oct. 12), 1939.

Where Air Sirens Wail—Here's hoping that we, hereabouts, will never have more than an academic interest in these two papers concerning air raid precautions which, in England, are organized under the Ministry of Health, which turns over to the local health official the responsibility for administration in his community.

MURCHIE, F., and BRUCE, C. R. Medical Air Raid Precautions (two papers). *J. Roy. Inst. Pub. Health & Hyg.* 2, 10:599 (Oct.), 1939.

Nursing Contributions to Child Health—Most of the time of the school nurse should be spent, not in school, but in the homes of the children, educating parents. Usually most of her working day is taken assisting in physical examinations or teaching health in classrooms rather than teaching teachers, or helping the individual children who need guidance. Remedies are considered.

ROSS, G. The Nurse's Contribution to the School Health Program. *J. School Health.* 9, 8:236 (Oct.), 1939.

In Place of Hog and Hominy—If we substitute nicotinic acid therapy

for adequate southern diets, some other deficiency disease will probably replace pellagra as a public health problem. Dietary guidance and the stimulation of kitchen gardens are what the south needs most.

SEBRELL, W. H. The Nature of Nutritional Diseases Occurring in the South. *Milbank Quart.* 17, 4:358 (Oct.), 1939.

About Communicable Diseases—Brief, but very much to the point, is this resumé of the present status of our knowledge about scarlet fever, diphtheria, meningitis, whooping cough, mumps, measles, and poliomyelitis. The forty references in the bibliography should give the epidemiologist plenty of mental ammunition.

WESSELHOEFT, C. Contagious Diseases. *New Eng. J. Med.* 221, 17:655 (Oct. 26), 1939.

Preventable Cancer Deaths—In New York City 15 per cent of all deaths were due to cancer. A large number of the 11,160 cancer fatalities might have been prevented. Here is a challenge which is discussed from a dozen different angles to make a most useful health educational symposium.

WOOD, F. C., *et al.* The Need for Educating the Public on Cancer (and other papers). *Neighborhood Health (N. Y. City).* 5, 6:1 (Nov.), 1939.

ASSOCIATION NEWS

THE SEDGWICK MEMORIAL MEDAL

Excerpt from the citation of Thomas Parran, M.D., who was awarded the Sedgwick Memorial Medal "for distinguished service in public health"

Milton J. Rosenau, M.D., *Chairman of the Sedgwick Memorial Medal Committee:*

"Public health in this country is fortunate in having at the helm a pilot who steers a clear course toward a health haven called health heaven. Dr. Thomas Parran, our Surgeon General, is a rare combination of sanitary statesmanship with a sound foundation

"It is my personal pleasure and official duty to award him the Sedgwick Memorial Medal for services to humanity with this citation:

"Courteous in thought and act, courageous in plan and execution of new concepts for the public good, precise and consistent in the conduct of the affairs of science as in the offices of the government, Dr. Thomas Parran, Surgeon General of the U. S. Public Health Service and Past-President of The American Public Health Association, to whom the Sedgwick Medal is now awarded, has endeared himself to his professional colleagues by his personal modesty in the midst of national acclaim and distinction, and to all who know him and know of him by his ringing challenge to action against the inertia and indifference of the generations to neglected human health. We rejoice in your honors and share in universal confidence in your leadership in public health."



Thomas Parran, M.D.

of experience in the practice of our art and a firm knowledge of the science that underlies good health administration. Dr. Parran has a fine feeling for the socially unfortunate and is ever ready to give a helping hand to the under-privileged.

Response of Dr. Parran:

"I am honored to receive at your hands, Dr. Rosenau, this symbol commemorating the name of Dr. Sedgwick, the great pioneer in public health.

"At this time also, I feel it particularly appropriate that we should be reminded of a passage in Dr. Sedgwick's presidential address before this Association, 24 years ago, as we stood aghast before the first World War. He said:

"It may seem to some as if, under the shadow of a war characterized as never before by the destruction of life, efforts for saving life through hygiene and sanitation must be of small matter.

"But it is not so. After the clouds, the sun. And we believe that after the present bloody conflicts are ended . . . the eternal principles underlying the nobler pursuits of Life, Liberty, Health and Happiness will once more move and inspire the nations as sunshine warms and quickens the earth after a storm. Meantime, we must prepare for active and intelligent dealing with the thousand new and mighty problems which these

wars are certain to bring before us, and to this task we turn with cheerful courage.'

"Even more than in 1915, it is important that we should be aware of what is in the world about us, yet refuse to be overwhelmed by it.

"For my part, and for those associated with me, may I say that we shall give all that we have of effort and devotion that the high traditions of the search for new knowledge and its application to the saving of life may go forward here in America though in other nations of the earth it may be swept aside."

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers

- Daniel Bergsma, M.D., 1671 Pennington Road, Trenton, N. J., Medical Assistant, Venereal Disease Control, State Dept. of Health
 Alvin R. Clauser, M.D., M.S.P.H., District Health Office, Los Lunas, N. M., Health Officer, Dept. of Public Health
 Bert H. Malone, M.D., C.P.H., Box 23, Waycross, Ga., Regional Medical Director, State Dept. of Health
 Charles E. McPartland, M.D., 29 S. Main St., West Hartford, Conn., Health Officer and Registrar of Vital Statistics
 Gilbert P. Pond, M.D., 1140 Lake St., Oak Park, Ill., Commissioner of Health

Laboratory Section

- Abraham Cantor, M.A., Laboratories of Public Health and Preventive Medicine, Univ. of Pennsylvania, Philadelphia, Pa., Instructor in Bacteriology
 Herbert M. Smith, M.D., State Board of Health, Columbia, S. C., Director, Hygienic Laboratory

Vital Statistics Section

- Frances M. James, M.A., 5304 New Hampshire Ave., N. W., Washington, D. C., Statistical Research Division, Children's Bureau

Engineering Section

- William J. O'Connell, Jr., 171 2nd Street, San Francisco, Calif., Technical Expert and Sanitary Engineer, Wallace & Tiernan Co., Inc.
 Thomas M. Sperbeck, A.B., 2810 Oakland Ave., Nashville, Tenn., Trainee, Vanderbilt University

Industrial Hygiene Section

- E. M. Adams, Ph.D., 501 E. Grove St., Midland, Mich., Industrial Hygiene Research, Dow Chemical Co.
 Robert H. Flinn, M.D., National Institute of Health, Bethesda, Md., Passed Assistant Surgeon, U. S. Public Health Service
 Augustus F. Galloway, M.D., Room 301, State House, Boise, Idaho, Director of Industrial Hygiene, State Division of Public Health

Food and Nutrition Section

- Mabel R. Stimpson, B.S., C.P.H., 203 N. Wabash Ave., Chicago, Ill., Nutrition Supervisor, Infant Welfare Society of Chicago

Maternal and Child Health Section

- Robert C. Hood, M.D., Children's Bureau, Washington, D. C., Director, Crippled Children's Division

Emily L. Ripka, M.D., M.P.H., Michigan Dept. of Health, Lansing, Mich., Regional Consultant, Bureau of Maternal and Child Health

Public Health Education Section

Paul W. Barenberg, A.B., C.P.H., 222 Cabot St., Beverly, Mass., Executive Secretary, Essex County Health Assn.

Dorothy R. Denniston, M.A., 69 Henry St., Binghamton, N. Y., Executive Secretary, Broome County Tuberculosis and Public Health Assn.

Elizabeth M. Kiewer, R.N., 1211 Harvard, Fresno, Calif., Director of Indian Welfare, Fresno County

Philip M. Law, M.D., 706 S. Wolcott St., Chicago, Ill., Director, Division of Mental Hygiene, Univ. of Loyola

Catherine F. Smulling, R.N., 212 S. Allen St., State College, Pa., Public Health Nurse, American Red Cross

Elizabeth A. Taylor, M.D., Box 3837, Denton, Tex., Physician and Director of Health Service, Texas State College for Women

Elmo W. Tucker, D.M.D., 430 Rialto Bldg., Butte, Mont., Orthodontist

Public Health Nursing Section

Hilda M. Brandt Carlson, 2917 West 76th St., Los Angeles, Calif., School Nurse, Los Angeles Board of Education

Marie E. Smith, R.N., Box 1124, Grants, N. M., Public Health Nurse, Valencia County Health Dept.

Grace M. Tubbs, R.N., 213 E. 9th St., Winfield, Kans., Visiting Nurse, Winfield Public Health Nursing Assn., Inc.

Frances D. Williams, 420 State Office Bldg., Denver, Colo., District Orthopedic Nurse, Division of Public Health Nursing, State Dept. of Health

Epidemiology Section

Joseph A. Bell, M.D., C.P.H., National Institute of Health, Rockville Pike, Bethesda, Md., Passed Assistant Surgeon, U. S. Public Health Service

Thomas D. Dublin, M.D., 440 West 34th St., New York, N. Y., Physician-in-Training, State Dept. of Health

Carl C. Dudley, Health Dept., City Hall, Houston, Tex., Food and Sanitary Inspector

Ira C. Miller, M.D., 2711 Logan St., Camp Hill, Pa., Epidemiologist, State Dept. of Health

James Watt, M.D., Dr.P.H., Box 111, Albany, Ga., Assistant Surgeon, U. S. Public Health Service

Stafford M. Wheeler, M.D., New York State Health Dept., Albany, N. Y., Assistant in Epidemiology and Preventive Medicine, Harvard Medical School (on leave of absence)

Unaffiliated

Charles L. Ianne, M.D., Santa Clara County Hospital, San Jose, Calif., Director, Bureau of Tuberculosis, Santa Clara County Health Dept.

H. Allen Moyer, M.D., State Administration Bldg., Lansing, Mich., State Health Commissioner

ELECTION OF TEN FELLOWS TO THE GOVERNING COUNCIL

THE nomination of 30 Fellows, carefully cosen for their Sectional affiliation and their geographic distribution by the Nominating Committee, has been noted in these columns. At the 68th Annual Meeting in Pittsburgh, October 17-20, 451 Fellows were registered, or 42 per cent of the Fellowship entitled to vote. Of the 262 ballots cast, 28 were disqualified by the tellers, leaving 234 qualified ballots. The following 10 Fellows were elected members of the Council for a 3 year term, expiring in 1942:

J. N. Baker, M.D.

Karl F. Meyer, Ph.D.

Harry S. Mustard, M.D.

George H. Ramsey, M.D.

W. S. Rankin, M.D.

Robert H. Riley, M.D.

L. R. Thompson, M.D.

W. Frank Walker, Dr.P.H.

Robert E. Wodehouse, M.D.

Hans Zinsser, M.D.

The Governing Council was advised of the election of Dr. James P. Leake of Washington as Chairman of the Epidemiology Section, which carries with it membership on the Governing Council. Dr. Dean Franklin Smiley of Ithaca, N. Y. was declared elected to the Council for the unexpired term of Dr. Leake, ending in 1941, since he had the next highest number of votes in the balloting.

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge.

Replies to these advertisements, when keyed, should be addressed to the American Public Health Association, 50 West 50th Street, New York, N. Y., identifying clearly the key number on the envelope.

POSITION AVAILABLE

State department of health wishes to employ a physician trained in statistical work. Salary to begin not less than \$3,000. W442

POSITIONS WANTED

ADMINISTRATIVE

Physician, M.D., University of Cincinnati; with postgraduate training in venereal disease control, Johns Hopkins; is available as venereal disease control officer. A363

Physician, M.D., Vanderbilt University; Dr.P.H., Johns Hopkins; experienced as epidemiologist, health officer and professor of preventive medicine, seeks position as administrator or epidemiologist. A397

Physician, M.P.H., Harvard; well experienced in city and rural health administration, will consider appointment as district health officer or in city or state health department. A418

Well qualified physician, M.D., Rush; M.S.P.H., University of Michigan; with 3 years' residence in tuberculosis, and special interest in venereal disease control, seeks responsible appointment. Excellent references. A406

Physician, 32, M.D., 1936; postgraduate course in venereal disease control, experienced as district health officer and in organizing and publicizing syphilis control campaign; now employed in charge v.d. clinics in metropolitan health department; seeks v.d. control post with opportunity to organize or administer program. A437

Physician, with C.P.H. from Johns Hopkins, and some field experience with large state health department, wishes position in epidemiology or administration. A443

Physician, M.D., class A medical school; 12 years' full-time public health experience; now employed with state department of health; will consider opening with well organized city or state department in communicable disease division, or epidemiology, or both. A409

Physician, M.D., Syracuse University; postgraduate studies in bacteriology and immunology, will consider position as health officer or epidemiologist. Has served as director of county health unit, director of industrial hygiene and medical statistics and venereal disease field survey officer. A305

HEALTH EDUCATION

Well qualified woman in health education wishes position as director of health education or health counselor. Has wide experience, and Ph.D. from New York University. H236

Experienced teacher in public health and author; M.A., Columbia; experienced in teaching public health nursing and carrying field promotion, wishes broad opportunity to train field personnel in extending knowledge and interest to the general public, especially through group education, institutes, exhibits and rural programs. H400

LABORATORY

Experienced teacher in bacteriology and public health; Ph.D., Cornell; now professor in grade A medical school, will consider teaching, executive or administrative position. M437

Experienced teacher in bio-chemistry and bacteriology; Ph.D., Iowa; now laboratory director in midwestern state; will consider teaching, executive or administrative position. L440

Young woman bacteriologist, M.A., Columbia; experienced in bacteriology, serology, mycology, parasitology, water and milk analysis, and general public health laboratory work; seeks responsible position in laboratory work or teaching of bacteriology. L444

MISCELLANEOUS

Engineer with good training and experience in water treatment, sewage plant operation and in research, wishes position as superintendent. Can go anywhere. E422

Advertisement

Positions Open

COUNTY HEALTH OFFICERS—Several for rural districts in South; men under 35 required unless they have public health training or experience; training provided for young men now completing internship, or with general practice experience; southerners preferred. PH-120, Medical Bureau, Palmolive Building, Chicago.

STAFF PHYSICIAN—California sanatorium; physician with 2-3 years' training in tuberculosis, qualified to do minor lung surgery; \$210, increasing. PH-121, Medical Bureau, Palmolive Building, Chicago.

WOMAN PHYSICIAN—Qualified for appointment in division of Maternal and Child Health; state department of health; South. PH-122, Medical Bureau, Palmolive Building, Chicago.

STUDENT HEALTH PHYSICIAN—Young man or woman whose training has been primarily in internal medicine; exclusive college for women; mid-south. PH-123, Medical Bureau, Palmolive Building, Chicago.

SUPERVISOR—Graduate nurse qualified to supervise city-county public health unit; must have public health certificate, popular southwestern winter resort. PH-124, Medical Bureau, Palmolive Building, Chicago.

SUPERVISOR—Well-established public health nursing association; duties include directing staff of nine in bedside nursing program; fairly large city, 2 hours' drive from New York. PH-125, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—For supervising position, county health department; considerable public health experience required; \$1,600, increasing; \$500 travel expenses; midwest. PH-127, Medical Bureau, Palmolive Building, Chicago.

CLINIC SUPERVISOR—Must have certificate or degree in Public Health Nursing; \$125; Texas. PH-128, Medical Bureau, Palmolive Building, Chicago.

STUDENT HEALTH NURSE—Duties largely general duty in college infirmary; \$100, meals; junior college for women. PH-129, Medical Bureau, Palmolive Building, Chicago.

BACTERIOLOGIST-SEROLOGIST—City laboratory; \$1,800-\$2,000; midwest. PH-130, Medical Bureau, Palmolive Building, Chicago.

SENIOR TECHNICIAN—Public health laboratory; must be thoroughly trained bacteriology, tissues; public health experience required; \$150; vicinity New York City. PH-131, Medical Bureau, Palmolive Building, Chicago.

Situations Wanted

PUBLIC HEALTH PHYSICIAN—Young man with M.S. in Public Health from university offering excellent course; unqualified recommendations from executives in public health field; for further information please write M. Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—B.S. and graduate nurse degree, state university; one year's post-graduate training in public health nursing; several years' teaching experience; 2 years, supervisor, medical clinics, university hospital; for further information, please write M. Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

YOUNG WOMAN PHYSICIAN—Extensive graduate training in pediatrics; 4 years, child hygiene division, state health department; several years, private practice pediatrics; wishes to return to full-time public health work; for further information, please write M. Burneice Larson, Medical Bureau, Palmolive Building, Chicago.

BACTERIOLOGIST—B.S., eastern school; C.P.H. and Ph.D. (Bacteriology), Yale University; has done considerable research; 4 years, bacteriologist and research technician, public health laboratories; for further details, please write M. Burneice Larson, Medical Bureau, Palmolive Building, Chicago.

NEWS FROM THE FIELD

NEW AFFILIATED SOCIETIES, A.P.H.A.

THE Idaho Public Health Association and the Tennessee Public Health Association were elected as Affiliated Societies of the American Public Health Association at the Pittsburgh meeting in October, making twenty-one Affiliated Societies in all at the present time.

SOCIAL HYGIENE DAY

NATIONAL Social Hygiene Day, an annual American public health event, will be observed for the fourth time on February 1, 1940, it has been announced by the American Social Hygiene Association.

RADIO PROGRAMS

THE United States Office of Education, a part of the Federal Security Agency, has announced a series of educational radio dramas on Democracy in Action relating to the United States Government and health. Beginning in November, the last three programs will be given Sunday afternoons, December 3, 10, and 17, from 2:00 to 2:30 P.M., Eastern Standard Time, over the Columbia Broadcasting System.

The topic of the first of these programs is "If the Truth Be Known," an attack on disease through the microscope and test tube; the second, "A New Lease on Life," the story of Uncle Sam's special patients; the third, "Partners in Prevention," a review of national, state, and local agencies and their battle for health.

BARNARD TO ESTABLISH HEALTH EDUCATION PROGRAM

A HEALTH educational program for Barnard College, New York, has been announced. It will be called the Milbank Anderson Health Education Fund, in honor of Mrs. Anderson, who presented Milbank Hall and Quadrangle to the college.

WHITE HOUSE CONFERENCE

IT has been announced by Miss Katharine F. Lenroot, Chief of the Children's Bureau and Executive Secretary of the White House Conference on Children in a Democracy, that President Roosevelt approves the recommendation of the Planning Committee of the White House Conference for the meeting dates January 18, 19, and 20, 1940.

This White House Conference, which had its first meeting on April 26, 1939, in Washington, has as its purpose to consider the relationship between a successful democracy and the children who form an integral part of the democracy. A report committee has under preparation a report to be submitted at the conference, together with suggestions for a follow up program.

MICHIGAN PUBLIC HEALTH ASSOCIATION

THE Michigan Public Health Association held its 19th Annual Public Health Conference, in coöperation with the Michigan Department of Health, at Grand Rapids, November 8-10. More than a thousand members of the health professions attended the three day sessions.

The following new officers were elected for the forthcoming year:

President—Henry F. Vaughan, Dr.P.H.
President-Elect—Floyd R. Town, M.D.
Vice-President—Lena Schermann, R.N.
Secretary-Treasurer—Marjorie Delavan
Representative on A.P.H.A. Governing Council—John L. Lavan, M.D.

Among the principal speakers were: Dr. H. Allen Moyer, Commissioner; Surgeon C. C. Applewhite, of the U. S. Public Health Service; Dr. Burton R. Corbus, President of the State Medical Society; Dr. Paul H. Jeserich, President of the State Dental Society; Dr. Bert I. Beverly, of Chicago; and Dr. S. David Kramer, Secretary of the

National Foundation for Infantile Paralysis.

Holding their annual meetings in conjunction with the conference, were the Michigan School Health Association, The Michigan State Association of Sanitarians, the State Organization for Public Health Nursing, and the Children's Fund of Michigan.

The Michigan Public Health Association, at its annual business meeting, voted to hold its 1940 meeting at Detroit, in conjunction with the annual meeting of the American Public Health Association which will be held there next year. The association also voted to award all of its past presidents honorary keys, symbolic of their services to the association.

AMERICAN SCHOOL HEALTH ASSOCIATION

NEW officers elected by the American School Health Association in Pittsburgh, Pa., October 18, include:

President, Dr. Charles L. Outland, Richmond, Va.

President-Elect, Dr. Amos L. Beagler, Denver, Colo.

Vice-Presidents, Dr. James F. Rogers, Washington, D. C., and Dr. Helen Ahrens Cary, Portland, Ore.

Executive Secretary, and Treasurer, Dr. A. O. DeWeese, Kent, Ohio

CONFERENCE OF MUNICIPAL PUBLIC HEALTH ENGINEERS

AT the meeting of the new society, the Conference of Municipal Public Health Engineers, held in Pittsburgh in October, the following officers were elected:

Chairman—Joel I. Connolly, Chicago, Ill.
Vice-Chairman—Aimé Cousineau, Montreal, Que., Can.

Secretary-Treasurer—Alfred H. Fletcher, Memphis, Tenn.

Executive Committee—F. Gardner Legg, Detroit, Mich.; Henry C. Lane, Pensacola, Fla.; James L. Barron, Hempstead, N. Y.; Arthur E. Gorman, Chicago, Ill.; William T. Ingram, Stockton, Calif.; Sol Pincus, New York, N. Y.

INTERNATIONAL SOCIETY OF MEDICAL HEALTH OFFICERS

NEW officers elected by the International Society of Medical Health Officers, elected in Pittsburgh, Pa., October 18, include:

President, Dr. Leon Banov, Charleston, S. C.

Vice-Presidents, Dr. James Roberts, Hamilton, Ont., and Dr. Angel de la Garza Brito, Mexico City, Mexico

Secretary, Dr. I. C. Riggin, Richmond, Va.

Directors, Dr. N. A. Upchurch, Jacksonville, Fla.; Frederick D. Stricker, Portland, Ore., and Dr. A. T. McCormack, Louisville, Ky.

THE ORAL HEALTH GROUP

THE Oral Health Group, an informal assembly of those in the American Public Health Association interested in oral health, again held sessions at the Annual Meeting in Pittsburgh in cooperation with several of the Sections. The Oral Health Group has elected the following officers for the coming year: Richard W. Leonard, D.D.S., Chief, Division of Oral Hygiene, Maryland Department of Health, Baltimore, *Chairman*; and J. M. Wisan, D.D.S., Dental Health Consultant, New Jersey Department of Health, Trenton, *Secretary*.

PENNSYLVANIA PUBLIC HEALTH ASSOCIATION

NEW officers elected by the Pennsylvania Public Health Association, on October 18, in Pittsburgh, Pa., are:

President, Harold F. Keller, Philadelphia
President-elect, Dr. Paul A. Keeney, Harrisburg

First Vice-President, Dr. Richard P. Lienhardt, Wayne

Secretary-Treasurer, C. E. Houston, Washington

Executive Board, Dr. James R. Smith, Erie; Arthur M. Dewers, Philadelphia; Dr. Henry Field Smyth, Sr., Philadelphia; Dr. J. Moore Campbell, Harrisburg, and Dr. W. W. McFarland, Pittsburgh

The 1940 meeting will be in Philadelphia.

TRI-STATE CONFERENCE OF FOOD AND HEALTH OFFICIALS

NEW officers elected by the Tri-State Conference of Food and Health Officials, on October 18, in Pittsburgh, Pa., include:

President, Dr. Reece M. Pedicord, Wheeling, W. Va.

Vice-President, Elmer E. Harter, Harrisburgh, Pa.

Second Vice-President, Charles M. McDonald, Akron, Ohio

Third Vice-President, Howard Patton, Pittsburgh, Pa.

Secretary-Treasurer, Thomas W. Henderson, Washington, Pa.

The winter conference will be held in Pittsburgh, in January, 1940.

STATE DIRECTORS OF LOCAL HEALTH SERVICE

THE initial meeting of the newly organized Conference of State Directors of Local Health Service was held in Pittsburgh, Pa., on October 16, at the time of the American Public Health Association annual meeting.

The Conference was organized with Dr. John Williams, Jr., Director of the Division of Local Health Administration, Jefferson City, Mo., as Secretary, and Dr. Marvin F. Haygood, Deputy Commissioner and Director of Local Health Service, Iowa State Department of Health, Des Moines, as Chairman.

ILLINOIS DISTRICT HEALTH UNITS

IT is announced by the Illinois State Department of Public Health, Springfield, that 19 district health units have been established, with another in prospect, rounding out the permanent working machinery of the department in the field.

Each unit embraces from two to seven counties, is in charge of a medical health officer who has had at least a short course in public health administration at a recognized school of public health, and has a minimum staff of a

public health nurse, a sanitary engineer, and a secretary. The function of these units is to promote the development of local health services and to render local health service in areas where no local machinery is available.

EUROPEAN JOURNALS AND THE WAR

THE American Documentation Institute requests that subscribers to European chemical or other scientific journals who do not receive their copies report the matter promptly. The Cultural Relations Committee of the Institute hopes to be able to surmount such war obstacles as interrupted transportation, embargoes, and censorship, which seriously affected the progress of research during the last war. It is hoped that the principle will be established that materials of research having no relation to war shall continue to pass freely, regardless of the countries of origin or destination.

Reports with full details of where subscription was placed, name and address of subscriber, volume, date and number of last issue received, should be sent to: American Documentation Institute, Bibliofilm Service, U. S. Department of Agriculture Library, Washington, D. C.

REORGANIZATION OF LABORATORY DIRECTORS' CONFERENCE

A REORGANIZATION of the Conference of State Laboratory Directors was effected at its 19th Annual Meeting in Pittsburgh on October 16, when a Constitution and By-Laws was adopted changing the name and expanding the organization into a Conference of State and Provincial Public Health Laboratory Directors with full membership privileges limited to directors of official state and provincial public health laboratories. The committee on reorganization which proposed the constitutional changes was composed of

the following members representing laboratories widely scattered geographically throughout the United States and Canada:

E. M. Bramhall, Utah
L. F. Ey, Ohio
Mac H. McCrady, Quebec
C. A. Perry, Sc.D., Maryland
E. S. Robinson, M.D., Massachusetts
T. F. Sellers, M.D., Georgia
H. J. Shaghnassy, Ph.D., Illinois
A. B. Wadsworth, M.D., New York
Friend Lee Mickle, Sc.D., Connecticut,
Chairman.

Associate membership was made available to the responsible assistants of directors of state and provincial laboratories and to the directors and responsible assistants in municipal and other official public health laboratories in the two countries.

In the newly adopted Constitution it is stated that the purposes and objects of the Conference shall be to promote the development, improvement, and effectiveness of public health laboratory service; to coördinate public health laboratory activities; to stimulate the interchange of experience among directors of official public health laboratories; to develop and maintain adequate standards for the professional training of public health laboratory personnel; to encourage constant effort toward the improvement and standardization of technical methods; to collect and make accessible to all persons in official administrative positions in public health laboratories such information and data as might be of assistance to them in the proper fulfillment of their duties.

It is proposed in the By-Laws that the Conference continue to meet annually at the place of the Annual Meeting of the American Public Health Association and on the day preceding the opening date. Scientific and business meetings open to the entire membership have been provided for, as well as executive sessions limited to full

members for action on matters of policy affecting state or provincial public health laboratories. The Conference will continue issuing annually a mimeographed volume of Proceedings which will be furnished to members and sold to other interested persons as in the past.

The officers and councillors elected for 1939-1940, all directors of state laboratories, are:

Chairman, Friend Lee Mickle, Sc.D., Connecticut

Vice-Chairman, L. F. Ey, Ohio

Secretary-Treasurer, Katherine E. Cox, West Virginia

Councillors, T. F. Sellers, M.D., Georgia;
E. S. Robinson, M.D., Massachusetts

ALCOHOLISM

A BROAD program for attacking the disease of alcoholism and the alcoholic psychoses, based on research, was approved by the newly elected executive committee of the Research Council on Problems of Alcohol, an associated society of the American Association for the Advancement of Science, according to an announcement by the committee's chairman, Dr. Karl M. Bowman, Director of Psychiatry, Bellevue Hospital, New York, N. Y.

Dr. Bowman also announced three grants of financial aid to the organization. The Carnegie Corporation has appropriated \$25,000 for a critical survey of all work done to date on the effects of alcohol upon the individual, a project sponsored by the Department of Psychiatry of the College of Medicine, New York University. It is under the supervision of Dr. Norman Jolliffe, Associate Professor of Medicine at New York University, who recently directed a survey of alcoholism and the alcoholic psychoses in Europe.

Through the Council, the American Philosophical Society is financing a study of the toxic factors in alcoholism, conducted at the New York Psychiatric

Institute under the direction of Dr. George A. Jervis. In addition, the Dazian Foundation for Medical Research has granted funds through the Council for research on the rôle of alcohol in liver cirrhosis, a project being initiated by the College of Medicine at New York University. Some 200 patients with liver cirrhosis will be subjected to clinical, chemical, and pathological study in an effort to reach a clearer understanding of the relation of alcohol to this disease.

With these three studies inaugurated, the Research Council on Problems of Alcohol has now decided to concentrate upon alcoholism until the end of 1941. Three major measures will be employed: (1) the evaluation and coördination of existing research; (2) the development of a research program along lines inadequately investigated or not yet explored, and (3) the dissemination of the results of such research.

PERSONALS

Central States

DR. FRED T. ANDREWS, formerly of Kalamazoo, Mich., has been selected as Health Officer for Bay County, effective October 9.

DR. CYRIL V. BLACK, of Pratt, Kans., has been appointed Health Officer of Pratt, Kans., filling the unexpired term of the late DR. CHARLES E. PHILLIPS.

JAMES A. DOLCE, M.D.,† former Assistant Director of the Allegan County Health Department and County Health Officer of Allegan County, Mich., has been appointed Acting Director of the Sanilac County, Mich., Health Department, during the absence of DR. L. D. GASTON.

DR. GEORGE J. FRAZIER, of Gregory, S. Dak., was presented with the 1939 achievement medal by the Indian Council Fire at a meeting in Chicago held September 22. Dr. Frazier has

been in the Indian Service for 25 years and at present serves among the Sioux of South Dakota.

CLIFTON HALL, M.D., M.P.H.,† is serving as Acting Director of the Mecosta-Osceola, Mich., Health Department during the absence of DR. M. C. IGLOE, who is at Johns Hopkins. Dr. Hall was formerly in charge of tuberculosis control activities in the Kansas State Board of Health.

EDWARD G. MCGAVRAN, M.D.,† of Hillsdale, Mich., has resigned as Director of the Hillsdale County Department of Health, to devote his time to research.

ROBERT V. SCHULTZ, M.D.,† Fellow in Public Health Education with the W. K. Kellogg Foundation, Battle Creek, Mich., has been awarded The New York Academy of Medicine Fellowship granted by the Rockefeller Foundation for the study and critical evaluation of medical education methods over the radio.

DR. EDWIN O. SQUIRE has been appointed Health Officer for the Coffeyville, Kans., Board of Health.

HENRY F. VAUGHAN, D.P.H.,* Commissioner of Health of Detroit, Mich., has been elected President of the Michigan Public Health Association.

Eastern States

DR. HOWARD S. ALLEN has been appointed Health Officer of Woodbury, Conn., succeeding DR. FRANK REICHENBACH.

DR. HOMER C. ASHLEY, of New Hartford, Conn., has been appointed Health Officer of Barkhamsted, Conn., filling the vacancy caused by the resignation of MARSHALL CASE.

DR. WILLIAM T. DAVIS, of Scranton, Pa., has been appointed Medical Director of Lackawanna County, succeeding DR. JOHN J. BENDICK, of Olyphant.

* Fellow A.P.H.A.

† Member A.P.H.A.

DR. EZRA POPE DICKINSON, of St. Michael, Pa., has been appointed Medical Director of Cambria County, succeeding DR. JAMES J. O'CONNOR, of Barnesboro.

DR. NORMAN H. GARDNER has been appointed Health Officer of East Hampton, Conn., succeeding DR. JOHN D. MILBURN, resigned.

DR. WILLIAM L. HIGGINS, of South Coventry, has been appointed Health Officer of Columbia, Conn.

ALFRED KORACH, M.D.,† of Cambridge, Mass., where he has been associated with the Department of Biology and Public Health of the Massachusetts Institute of Technology as a visiting lecturer in public health administration, has now joined the Department of Preventive Medicine of the University of Cincinnati College of Medicine, as a lecturer on preventive medicine.

DR. DANIEL E. SHEA, formerly Director of the Bureau of Venereal Diseases of the Hartford, Conn., Department of Health on a part-time basis, has been appointed full-time Director of the Bureau.

Southern States

THOMAS H. BLAKE, M.D.,† Director of County Health Work of the West Virginia State Health Department, has resigned to enter private practice at St. Albans.

ROBERT E. BONDY, Director of Disaster Relief of the American Red Cross, has been appointed Director of Public Welfare of the District of Columbia.

JOHN F. CADDEN, M.D.,† of South Charleston, W. Va., Director of the Bureau of Industrial Hygiene of the West Virginia State Department of Health, has resigned, to become Medical Director of the plant of the American Viscose Corporation at Roanoke, Va.

DR. JOE DORROUGH, of Haileyville,

Okla., has been appointed Health Superintendent of Pittsburg County. DR. WELDON K. HAYNIE, of Durant, Okla., has been appointed Health Superintendent of Bryan County.

JOHN F. KENDRICK, M.D.,† of Raleigh, N. C., has been assigned temporarily by the International Health Division of the Rockefeller Foundation to direct the Stanley County project in health education in public schools that has been chosen by the State Board of Health and the State Board of Education as the first of a program to be financed by a \$50,000 grant from the Foundation.

DR. JOHN A. MORROW, of Sallisaw, Okla., has been appointed Deputy Health Commissioner of the Oklahoma State Health Department.

DR. BRUCE H. POLLOCK, M.D.,* of Point Pleasant, W. Va., has been appointed Director of County Health Work of the West Virginia State Health Department, succeeding THOMAS H. BLAKE, M.D.,† resigned.

DR. CHARLES N. SCOTT, Director of the Bureau of Venereal Disease of the West Virginia State Health Department, has accepted a position as Medical Director of the plant of the American Viscose Corporation at Nitro, W. Va.

Western States

ALVIN R. CLAUSER, M.D.,† of Los Lunas, N. M., has been appointed Deputy District Health Officer for New Mexico Health District No. 8, in the absence of DR. W. DRUMMOND RADCLIFFE who is attending Johns Hopkins University for a year in public health administration.

LYMAN C. DURYEA, M.D., C.P.H., who recently returned from Honolulu, has been appointed Director of the New York City Commission for the Study

* Fellow A.P.H.A.

† Member A.P.H.A.

of Crippled Children, succeeding Vernon W. Lippard, M.D.

FLORENCE FISHER has been appointed Acting Director of Public Health Nursing in the Department of Public Health during the absence of Mrs. FANNIE T. WARNCKE,† who is taking a course in public health nursing at Columbia University.

HELEN JAMES McMILLAN† has resigned as Consultant Nurse in the Division of Public Health Nursing of the New Mexico Department of Public Health, effective October 1.

DR. EDWIN E. McNIEL, of Honolulu, has been appointed Director of the Bureau of Mental Hygiene and in charge of the Mental Hygiene Clinic under the Board of Health in Hawaii.

ROLLO J. SHALE, M.D., M.S.P.H.,† formerly Health Officer of Weld County, Colo., has been appointed Health Officer of Ontonagon and Baraga Counties, Mich. He succeeds PEARL A. TOIVONEN, M.D.,† who recently married Dr. Niilo E. Leppo, a Rockefeller Foundation fellow from Finland in this country.

DEATHS

DR. LIVINGSTON FARRAND,* president emeritus of Cornell University, died November 8, at the age of 72.‡ He became a member of the American Public Health Association in 1910

and a Fellow in 1922. He was Treasurer of the Association in 1913, on the Governing Council 1915-1918, 1926-1929, and 1930-1933. He served as Editor of the *American Journal of Public Health* in 1912 and 1913, and as one of the Advisory Editors from 1914 to 1916.

DR. ALLEN J. HRUBY,† Secretary and Trustee of the Chicago Municipal Tuberculosis Sanitarium, died November 18, at the age of 49.

DR. RICARDO JORGE, delegate from Portugal on the Comité Permanent de l'Office International d'Hygiène Publique, died recently. He wrote on many subjects, but notably on plague, yellow fever, cholera, typhus, smallpox, and la grippe. He is perhaps best known in this country through his coining of the word "peste selvatique," which Dr. Karl Meyer has put into use as "sylvatic" plague. Dr. Jorge first brought it to us in the publication "Rongeurs et puces dans la conservation et la transmission de la peste" (Rodents and Fleas in the Conservation and Transmission of Bubonic Plague). Dr. Jorge was 81 years of age.

CHARLES R. TYLER,† Bacteriologist in charge of the Diagnosis Laboratory of the New York City Department of Health, died recently, at the age of 59.

* Fellow A.P.H.A.

† Member A.P.H.A.

‡ See also page 1353.

CONFERENCES AND DATES

American Association for the Advancement of Science. Annual Meeting—Columbus, Ohio, December 27, 1939-January 2, 1940.

American Association of Schools of Social Work. Washington, D. C. January, 1940.

American Congress on Industrial

Health. Chicago, Ill. January 15-16, 1940.

American Medical Association—91st Annual Meeting. New York, N. Y. June 10-14, 1940.

American Public Welfare Association. Round Table and Annual Meeting. Washington, D. C. December 6-10.

AMERICAN SCIENTIFIC CONGRESS—8th. In connection with celebration of 50th Anniversary of founding of the Pan American Union. Washington, D. C. May 10-18, 1940.

AMERICAN SOCIETY OF CIVIL ENGINEERS. Annual Meeting. New York, N. Y. January 17-19, 1940.

AMERICAN STATISTICAL ASSOCIATION—Annual Meeting. Philadelphia, Pa. December 27-30.

AMERICAN STUDENT HEALTH ASSOCIATION. Annual Meeting. Hotel New Yorker, New York, N. Y. December 28-29.

AMERICAN WATER WORKS ASSOCIATION: New York City Section. Hotel Commodore. December 28.

CANADIAN PUBLIC HEALTH ASSOCIATION. Eight Annual Christmas Meeting of the Laboratory Section. Royal York Hotel, Toronto, Ont., Can. December 18-19.

CONVENTION FOR THE REVISION OF THE PHARMACOPOEIA OF THE UNITED STATES. Washington, D. C. May 14, 1940.

FLORIDA PUBLIC HEALTH ASSOCIATION. Jacksonville, Fla. December 7-9.

INTERNATIONAL COLLEGE OF SURGEONS—United States Chapter. 4th Annual Assembly. Venice, Fla. February 11-14, 1940.

INTERNATIONAL HEATING AND VENTILATING EXPOSITION—Sixth. Under auspices of the American Society of Heating and Ventilating Engineers, and coinciding with its 46th Annual Meeting. Lakeside Hall, Cleveland, Ohio. January 22-26, 1940.

MASSACHUSETTS PUBLIC HEALTH ASSOCIATION. Golden Anniversary Meeting. January 25, 1940. Boston, Mass.

MICHIGAN PUBLIC HEALTH ASSOCIATION. Detroit, Mich. October, 1940.

MISSISSIPPI PUBLIC HEALTH ASSOCIATION. Jackson, Miss. December 6-8.

NATIONAL ASSOCIATION OF HOUSING OFFICIALS. New Orleans, La. December 6-8.

NATIONAL PUBLIC HOUSING CONFERENCE. Washington, D. C. January 26-28, 1940.

NATIONAL SOCIAL HYGIENE DAY—4th Annual Observance. February 1, 1940.

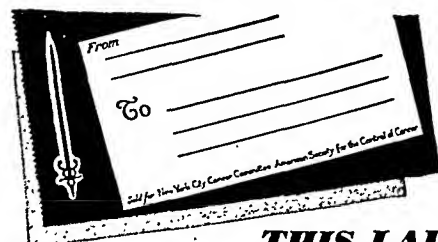
NATIONAL WARM AIR HEATING AND AIR CONDITIONING ASSOCIATION. Cleveland, Ohio. January 22-26, 1940.

PAN AMERICAN UNION. Celebration of the Fiftieth Anniversary. Washington, D. C. April 14, 1940.

SOCIETY OF AMERICAN BACTERIOLOGISTS. New Haven, Conn. December 28-30.

SOUTHERN CALIFORNIA PUBLIC HEALTH ASSOCIATION. Long Beach, Calif. January 24, 1940.

WHITE HOUSE CONFERENCE ON CHILDREN in a Democracy. Washington, D. C. January 18-20, 1940.



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Standard Methods Committee on Diagnostic Procedures and Reagents

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Gonorrhea and the Gonococcus—Charles M. Carpenter, M.D., University of Rochester, Rochester, N. Y.

Laboratory Diagnosis of Rabies—Thomas F. Sellers, M.D., State Board of Health, Atlanta, Ga.

Laboratory Diagnostic Procedures in the Recognition of Various Food Poisonings—S. A. Koser, Ph.D., University of Chicago, Chicago, Ill.

Laboratory Methods for the Diagnosis of Fungus Diseases—W. D. Stovall, M.D., State Laboratory of Hygiene, Madison, Wis.

Meningitis and Meningococcus—Sara E. Branham, M.D., Ph.D., National Institute of Health, Washington, D. C.

Recognition and Significance of Hemolytic Streptococci in Infectious Diseases—Julia M. Coffey, State Department of Health, Albany, N. Y.

Recognition of Pneumococcus Types Associated with Pneumonia—Elliott S. Robinson, M.D., Ph.D., Department of Public Health, Boston, Mass.

Serological and Bacteriological Procedures in the Diagnosis of Enteric Fevers—Marion B. Coleman, State Department of Health, Albany, N. Y.

Serological, Bacteriological and Other

Biological Procedures in the Diagnosis of Undulant Fever—G. D. Cummings, Ph.D., State Department of Health, Lansing, Mich.

Serological Tests for the Diagnosis of Syphilis—Ruth Gilbert, M.D., State Department of Health, Albany, N. Y.

Studies on the Toxicity of Dyes for Bacteria—Edmund K. Kline, Dr.P.H., Cattaraugus County Department of Health, Olean, N. Y.

Tuberculosis and the Tubercle Bacillus—A. L. MacNabb, D.V.M., Department of Health, Toronto, Ont.

Tularemia and Bacterium Tularense—J. G. McAlpine, Ph.D., District State Laboratories, Montgomery, Ala.

Typhus Fever and Laboratory Methods for its Recognition—Henry Welch, Ph.D., U. S. Food and Drug Administration, Washington, D. C.

Whooping Cough and B. Pertussis—Pearl L. Kendrick, Sc.D., State Department of Health, Grand Rapids, Mich.

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Complement-Fixation Test for Syphilis—Elizabeth Maltaner, State Department of Health, Albany, N. Y.

Laboratory Diagnosis of Diphtheria—Martin Frobisher, Jr., D.Sc., Johns Hopkins University, Baltimore, Md.

Laboratory Diagnosis of Rabies—Harry Carnes, State Department of Health, Atlanta, Ga.

Laboratory Methods for the Diagnosis of Fungus Diseases—Lois Almon, Ph.D., State Laboratory of Hygiene, Madison, Wis.

Toxicity and Brilliant Green for Certain Bacteria—Cassandra Ritter, Water and Sewage Laboratory, University of Kansas, Lawrence, Kans.

Tuberculosis and the Tubercle Bacillus—M. H. Brown, M.D., University of Toronto, Toronto, Ont.

Tularemia and Bacterium Tularense—George D. Brigham, Ph.D., U. S. Quarantine Station, Mobile, Ala.

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Chemical Methods for Water—A. M. Buswell, Ph.D., Water Survey, 57 Chemical Building, Urbana, Ill., and S. T. Powell, State Department of Health, Baltimore, Md.

Chemical Methods of Sewage—F. Wellington Gilcreas, State Department of Health, Albany, N. Y.

Coliform Group Variants—Leland W. Parr, Ph.D., George Washington University, Washington, D. C.

Microscopic Methods of Water—Theodore A. Olson, State Department of Health, Minneapolis, Minn.

Swimming Pool and Bathing Place Waters—W. L. Mallmann, Ph.D., Michigan State College, East Lansing, Mich.

Waterways Pollution—M. S. Nichols, Ph.D., State Laboratory of Hygiene, Madison, Wis.

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Comparative Tests of Agar Media for Standard Milk Work—C. A. Abele, Ch.E., State Board of Health, Montgomery, Ala.

Laboratory Equipment—R. V. Stone, D.V.M., 829 So. 6th Street, Alhambra, Calif.

Methods for Detecting Organisms of Colon Group—A. J. Slack, M.D., Institute of Public Health, London, Ont.

Methods of Counting Bacteria in Dairy Products—A. H. Robertson, Ph.D., State Department of Agriculture and Markets, Albany, N. Y.

Methods of Detecting Specific Types of Bacteria in Dairy Products—Mac H. McCrady, 89 Notre Dame East, Montreal, Que.

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Ice Cream—F. W. Fabian, Ph.D., Michigan State College, East Lansing, Mich.

Laboratory Equipment—Clifford N. Stark, Ph.D., Cornell University, Ithaca, N. Y.

Methods of Examining Milk for Evidences of Brucella Infection—I. F. Huddleson, Ph.D., Michigan State College, East Lansing, Mich.

Methods of Examining Milk for Tubercle Bacilli—W. A. Hagan, D.V.M., 320 The Parkway, Ithaca, N. Y.

Methods of Identifying Streptococci in Dairy Products—G. J. Hucker, Ph.D., State Agricultural Experiment Station, Geneva, N. Y.

Methylene Blue Reductase Test—H. R. Thornton, Ph.D., University of Alberta, Edmonton, Alta.

Microbiological Methods for Examining Butter—E. H. Parfitt, Ph.D., Purdue University, Lafayette, Ind.

Milk Sediment Test—Caryl C. Carson, 166 Freeman Street, Hartford, Conn.

Standard Procedures for Controlling Milk at U. S. Army Posts, Captain A. T. Thompson, Army Medical Center, Washington, D. C.

Sterility of Dairy Utensils—Walter von D. Tiedeman, M.C.E., State Department of Health, Albany, N. Y.

Utilization of Milk and Digestive Milk on Standard Media—C. S. Mudge, Ph.D., University of California, Davis, Calif.

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Standard Methods Committee on Analyzing Frozen Desserts (Joint with the Committee of the Food and Nutrition Section)

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Microbiological Examination of Frozen

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Microbiological Examination of Ingredients—F. W. Fabian, Ph.D., Michigan State College, East Lansing, Mich.

Sediment Testing of Frozen Desserts and Ingredients—Milton E. Parker, 1526 S. State Street, Chicago, Ill.

Stabilizers and Gelatins in Frozen Desserts—James Gibbard, Department of Pensions and National Health, Ottawa, Ont.

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Microbiological Examination of Condensed and Evaporated Milk—P. A. Downs, Ph.D., University of Nebraska, Lincoln, Neb.

Microbiological Examination of Dry Milk—Paul S. Prickett, Ph.D., Mead Johnson & Company, Evansville, Ind.

Microbiological Examination of Eggs—L. H. James, Ph.D., University of Maryland, College Park, Md.

Microbiological Examination of Flavors and Colors—M. J. Prucha, Ph.D., University of Illinois, Urbana, Ill.

Microbiological Examination of Fruits and Nuts—P. H. Tracy, Ph.D., University of Illinois, Urbana, Ill.

Microbiological Examination of Sugar—H. H. Hall, U. S. Department of Agriculture, Washington, D. C.

Sediment Testing of Butter and Eggs—Bernard E. Proctor, Ph.D., Massachusetts Institute of Technology, Cambridge, Mass.

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Ruth W. Hay

Kathryn C. Trent, R.N.

Abbie R. Weaver, R.N.

Committee to Define Public Health Nursing Problems Needing Research and Study (Unallocated)

Margaret G. Arnstein, R.N., *Chairman*, University of Minnesota, Minneapolis, Minn.

Helen Bean, R.N.

Dorothy J. Carter, R.N.

Elizabeth G. Fox, R.N.

Ann M. Hellner, R.N.

Hortense Cikovsky, R.N.

Mary B. Hulsizer, R.N.

Marian G. Randall, R.N.

Public Health Education Section

Committee on Health Education Institute (Unallocated)

Prof. Ira V. Hiscock, *Chairman*, Yale University, New Haven, Conn.

Mary P. Connolly

Evelyn K. Davis

H. E. Kleinschmidt, M.D.

W. F. Walker, Dr.P.H.

Clair E. Turner, Dr.P.H. (*ex officio*)

Thomas G. Hull, Ph.D.

H. E. Kleinschmidt, M.D.

Bleecker Marquette

Committee on By-Laws (Unallocated)

Prof. Ira V. Hiscock, *Chairman*, Yale University, New Haven, Conn.

Mary P. Connolly

Clair E. Turner, Dr.P.H. (*ex officio*)

Committee to Consider Space in the Journal for Health Education Material (Unallocated)

Carl A. Wilzbach, M.D., *Chairman*, 3111 Parkview Avenue, Cincinnati, O.

Homer N. Calver

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Program Committee (Unallocated)

Carl A. Wilzbach, M.D., *Chairman*, Commissioner of Health, Cincinnati, O.

Donald B. Armstrong, M.D.

George A. Dundon

Iago Galdston, M.D.

Raymond H. Greenman

Committee on Coördination in Health Education (Joint with the Health Officers Section) (Unallocated)

Clair E. Turner, Dr.P.H., *Chairman*, Massachusetts Institute of Technology, Cambridge, Mass.

J. Rosslyn Earp, M.D.

Prof. Ira V. Hiscock

J. J. Sippy, M.D.

Henry F. Vaughan, Dr.P.H.

Harold H. Walker, C.P.H., Ph.D.

Committee on Health Department Libraries

Reba F. Harris

Resolutions

THE following Resolutions* were unanimously adopted by the Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 27, 1938:

I. APPRECIATION TO KANSAS CITY OFFICIALS AND GROUPS

RESOLVED that the officers and members of the American Public Health Association present at its 67th Annual Meeting in Kansas City, Missouri, express their sincere gratitude and deep appreciation to the City Manager, the Mayor, and the Council of Kansas City, and to the Chamber of Commerce for their reception and their gracious hospitality, and be it further

RESOLVED that the warm thanks of officers and members be extended to Dr. Edwin H. Schorer, Health Director of Kansas City, and General Chairman of the Local Committee, to every member of his committee, to the superintendents of the Municipal Hospitals and to the commissioners of the various divisions of the Health Department, for their many courtesies and their efficiency in making provisions for this meeting and in the conduct thereof.

II. APPRECIATION OF KANSAS CITY MUNICIPAL AUDITORIUM

RESOLVED that the American Public Health Association record its appreciation of the beauties and utilities of the Municipal Auditorium of Kansas City, and extend its thanks to the Director of the Auditorium and his staff for their effective support and aid in the planning and conducting of the numerous scientific sessions and social events held in the Auditorium.

III. THANKS TO THE PRESS AND RADIO

RESOLVED that the American Public Health Association acknowledge its indebtedness to the press and the radio, national, state and local, for its excellence of service in connection with the 67th Annual Meeting.

IV. APPRECIATION TO EXHIBITORS

RESOLVED that the American Public Health Association express its warm appreciation to its friends and co-operators who have presented at its 67th Annual Meeting such excellent exhibits, both scientific and technical, and which are of such great interest and value to the public health profession.

V. THANKS TO EXECUTIVE SECRETARY AND STAFF

RESOLVED that the commendation of the officers and of the members be recorded to the Executive Secretary, Dr. Reginald M. Atwater and his efficient staff.

VII. CONTROL OF TRICHINOSIS

WHEREAS thousands of necropsy examinations in many sections of the United States indicate that about 1 person in every 6 is infested with the trichina parasite, *Trichinella*

* Resolutions VI. Appreciation of Participation by Dr. Irvin Abell, VIII. Effective Control of Drugs, IX. Basic Requirements for Medical Practice and the Use of Animals in Scientific Research, and X. The National Health Program, were published in the December, 1938, issue of the *Journal*.

spiralis, and that approximately 2.5 per cent of positive cases represent infestations of a degree capable of producing clinical trichinosis,

WHEREAS these facts, together with a marked increase in the number of cases reported during the past few years, would seem to indicate that trichinosis is a public health problem of greater importance than has been realized previously, and

WHEREAS the methods now employed in the United States are not sufficiently effective nor sufficiently inclusive to form a basis for any adequate control of the disease, and

WHEREAS human trichinosis is based for the most part on swine trichinosis, and the most important factor in the causation of swine trichinosis is the practice of feeding uncooked garbage, containing scraps of raw pork, to swine, and

WHEREAS it would appear that 40 to 50 per cent of American municipalities dispose of their garbage by feeding it to swine, a practice which is directly responsible for the dissemination of the trichina parasite in the local population, and

WHEREAS the control of the practice of feeding garbage to swine appears at the present time to be the most practical, the most inexpensive and the most logical approach to the problem of trichinosis control, therefore be it,

RESOLVED that the American Public Health Association lend all encouragement possible to any plan looking to the control of human trichinosis, and urge that all public health officials be requested to give active support to any campaign for the control of this disease; that local and state health officials be requested to take due cognizance of local conditions as related to trichinosis and endeavor, when possible, to make provision for suitable control meas-

ures, such as the licensing of garbage feeding plants, the cooking of garbage for a period of time sufficient to destroy all trichinae, and the supervision of such plants by health departments or other suitable agencies; and That health officials of cities and towns should take active steps to encourage the use of methods of garbage disposal other than disposal by feeding to swine, or to encourage the cooking of municipal garbage before its consumption by swine, as a health measure for the protection of citizens of the municipality.

XI. IN MEMORIAM

RESOLVED that it is with a sense of irreparable loss that the American Public Health Association records the deaths since our last Annual Meeting of the following of its Fellows and members:

- Elmer G. Balsam, M.D., Billings, Mont.,
Elected Member 1935
- George P. Barth, M.D., Milwaukee, Wis.,
Elected Member 1918, Fellow 1928
- Professor Theodore J. Bradley, Boston,
Mass., Elected Member 1920
- Lawrason Brown, M.D., Saranac Lake,
N. Y., Elected Member 1915, Fellow
1923, Life Member 1929
- W. Alfred Buice, M.D., Dr.P.H., Chelsea,
Okla., Elected Member 1925, Fellow 1934
- William C. Buntin, M.D., Staten Island,
N. Y., Elected Member 1936
- Ada B. Coffey, R.N., New York, N. Y.,
Elected Member 1931
- Royal S. Copeland, M.D., New York, N. Y.,
Elected Member 1918, Fellow 1922, Life
Member 1936
- Samuel M. Creswell, M.D., Tacoma, Wash.,
Elected Member 1931, Fellow 1934
- R. B. Durfee, M.D., Bisbee, Ariz., Elected
Member 1919, Fellow 1934
- Paul Eaton, M.D., Orange Park, Fla.,
Elected Member 1930
- W. F. Elgin, M.D., Glenolden, Pa., Elected
Member 1900, Fellow 1922
- John N. Force, M.D., Dr.P.H., Berkeley,
Calif., Elected Member 1920, Fellow 1934
- Robert W. Fowler, M.D., Richmond Hill,
L. I., N. Y., Elected Member 1937
- Wade H. Frost, M.D., Baltimore, Md.,
Elected Member 1909, Fellow 1923

- Arthur M. Gibbs, M.D., C.P.H., Hamburg, Ark., Elected Member 1931
- Marion A. Gleason, M.D., Providence, R. I., Elected Member 1924
- Maurice C. Hall, Ph.D., D.V.M., Washington, D. C., Elected Member 1936
- I. Malinde Havey, R.N., Washington, D. C., Elected Member 1922, Fellow 1932
- Edgar R. Hiatt, M.D., Troy, O., Elected Member 1927
- Charles H. Hood, D.Sc., Boston, Mass., Elected Member 1913
- Vera H. Jones, M.D., Denver, Colo., Elected Member 1936
- Charles E. Kaufman, M.D., West Haven, Conn., Elected Member 1935
- Charles D. Kline, M.D., Nyack, N. Y., Elected Member 1919
- Charles H. Lawall, Sc.D., Philadelphia, Pa., Elected Member 1914, Fellow 1922
- Renwick H. Leitch, D.Sc., Auchincruive, Ayr, Scotland, Elected Member 1933
- Mary Lucier, New York, N. Y., Elected Member 1936
- Lloyd Moffitt, M.D., Yakima, Wash., Elected Member 1931, Fellow 1933
- August G. Nolte, Jefferson City, Mo., Elected Member 1937
- Arthur O. Peters, M.D., Dayton, O., Elected Member 1936
- O. C. Pickel, Ph.D., Salt Lake City, Utah, Elected Member 1926
- Henry S. Plummer, M.D., Rochester, Minn., Elected Member 1924
- Gus H. Radebaugh, Urbana, Ill., Elected Member 1933
- John M. J. Raunick, M.D., Harrisburg, Pa., Elected Member 1915, Fellow 1922
- T. H. Rockwell, M.D., New York, N. Y., Elected Member 1916
- William F. Roberts, M.D., St. John, N. B., Canada, Elected Member 1936
- George H. Roth, M.D., Los Angeles, Calif., Elected Member 1920, Fellow 1933
- Henry A. Rowland, Toronto, Ont., Canada, Elected Member 1920
- John N. Ryan, M.D., Passiac, N. J., Elected Member 1915
- DeWitt T. Smith, M.D., Dallas, Tex., Elected Member 1926
- Bertha K. Spector, Ph.D., Chicago, Ill., Elected Member 1919
- Belle M. Wagner, Chattanooga, Tenn., Elected Member 1926
- Jason Waterman, Washington, D. C., Elected Member 1935
- Frank L. Watkins, M.D., Great Falls, Mont., Elected Member 1927, Fellow 1931
- L. J. Zoeller, Ivorydale, O., Elected Member 1930, Fellow 1934

Reports of Committees

THE By-laws of the American Public Health Association provide that no standards shall be promulgated as the official and authorized judgment of the Association except with the approval of the Governing Council. Except where specifically noted to the contrary, the following reports are in the nature of progress reports from committees, most of which have had Section approval, but which have not been presented for Governing Council action, and therefore are not to be interpreted as standards approved by the American Public Health Association.

Hygiene of Housing*

1. *The Problem*

It is increasingly clear that the housing movement constitutes one of America's major interests at the present moment. Fifty-one housing projects have been completed in 36 cities under the Public Works Administration program, and the U. S. Housing Authority has at its disposal a sum of \$800,000,000 for further urban developments. The growth of interest in public housing is reflected in the fact that 220 cities now have municipal housing authorities, as compared with 45 cities one year ago. Furthermore, there is increasing recognition of the importance of other aspects of the problem, such as public housing for relief groups, housing for the rural population, development of housing plans on a self-supporting economic basis for higher income groups (assisted by loans from the Federal Housing Administration), and general rehabilitation of urban blighted areas. This type of activity appeals not only to governmental agencies; it has shown remarkable attractiveness to certain types of private enterprise, as illustrated

by the sponsorship of housing projects by certain insurance companies and philanthropic agencies. Throughout the entire housing field, health considerations, including those of mental and social as well as physical health, must be paramount.

2. *The Rôle of the Committee*

The Committee on the Hygiene of Housing was established in 1936 as a committee of the American Public Health Association, serving also as our national group coöperating with the Housing Commission of the Health Organization of the League of Nations. The active work of the committee has been made possible by grants from the Milbank Memorial Fund for the latter half of 1937 and for the year 1938. The committee, comprising 16 representatives of various technical fields concerned, and drawing its personnel from the entire country, has held 7 well attended meetings.

The committee has been represented (at League expense) at 3 meetings in Geneva, and will have a delegate at another meeting this winter; American experience has also contributed in important degree to reports issued from

* Report of the Sub-Committee, presented to the Committee on Research and Standards.

Geneva on heating and ventilation and lighting of the home. At the annual convention of the American Public Health Association in 1937, the committee presented a symposium, and in October, 1938, the chairman delivered an address on the rôle of the health officer in the housing program. (It is gratifying to note that, in the new edition of the *Appraisal Form for Local Health Work*, items relating to housing are for the first time included.) At both meetings, the committee was represented in the exhibit section. It also is planning and carrying out an exhibit on the hygiene of housing for the World's Fair in New York (at the expense of the sponsor of this particular exhibit). Our relations with the National Association of Housing Officials have been intimate and satisfactory, and its recent report on Physical Standards and Construction has been worked out in intimate relations with our staff and is essentially based on our recommendations.

We reported last year the completion of our first general committee report, on Basic Principles of Healthful Housing, which has been accepted as authoritative by the governmental agencies interested in this field and has had wide circulation among housing officials, health officers, technicians, colleges, and universities. During the past year, the committee staff has completed an extensive study of heating and ventilation, lighting and problems of noise, and conditions affecting accidents, in occupied dwellings in New Haven, New York, and Norris, Tenn.—the first study ever made in this country which reveals the actual conditions obtaining in the home. With this study have been combined important researches under the direction of E. S. Draper in experimental houses operated by the Tennessee Valley Authority. From this work there have emerged numerous points which will be of substantial aid in

planning housing projects. Professor Adams, of the Massachusetts Institute of Technology, has been engaged in a study for the committee on recreational space requirements, a field where it is most important that concrete evidence should replace armchair generalization. Professor Chapin, of Minnesota, is conducting investigations of the social results which ensue when families are moved from bad to good housing conditions. Mr. Whittaker, of the Minnesota State Department of Health, has prepared an admirable discussion, with detailed plans, of sanitary provisions for the isolated rural home; and Mr. Britten, of the U. S. Public Health Service, is making an analysis of housing data in the National Health Survey which should prove of substantial importance.

3. Looking Ahead

At the recent meeting of the committee in Washington, it was decided that, in the immediate future, our major efforts should be concentrated on the development of a program for the effective coöperation of health officers in the housing program. In certain cities we have been asked to assist health departments in preliminary surveys to be conducted by them in connection with the housing program of the cities operating under U.S.H.A. grants, and other cities have asked for our help in the development of adequate housing ordinances. Under the stimulus of the federal program, it seems certain that more widespread and fundamental housing surveys will be conducted during the next year than ever before, and it is very probable that at no time in the future will quite such extensive investigations of this kind be carried out. The most immediate need is for a suitable survey technic which can be used as a basis for obtaining federal funds, as an aid in the selection of sites for new projects, and as a guide for

demolition and rehabilitation in sub-standard areas. The committee is now at work on such a schedule in coöperation with the U.S.H.A. and the F.H.A. Our next problem is to study existing legislation in various cities and to devise means for coördinating the efforts of the health department, the building department, and the fire department in evolving a unified plan for local work. Our field studies and the investigations of heating and ventilation, lighting, noise control, home safety, recreation space, and social aspects of housing will be continued. It is our belief that these studies will ultimately make a substantial contribution to rural housing and to housing of upper-income classes on an economic basis, as well as in the field of federally subsidized urban housing.

The invitations which representatives of the committee have received to participate in programs of the American Public Health Association, the National Association of Housing Officials, the American Society of Planning Officials,

and the International Management Congress, as well as the coöperation which has been shown by the United State Housing Authority, the Federal Housing Administration, and the official group now studying the possibility of a housing census in 1940, offer gratifying evidence of the fundamental rôle which the committee may play in this field.

C.-E. A. WINSLOW, *Chairman*

R. H. BRITTEN, *Secretary*

FREDERICK J. ADAMS

F. S. CHAPIN

JOEL I. CONNOLLY

ROBERT L. DAVISON

EARLE S. DRAPER

JAMES FORD

J. ANDRE FOUILHOUX

GRETA GRAY

JAMES E. IVES

M. G. LLOYD

B. M. PETTIT

GEORGE C. RUHLAND

HAROLD A. WHITTAKER

ALLAN A. TWITCHELL, *Technical Secretary*

PHILIP E. NELBACH, *Field Secretary*

Association Committee on American Museum of Hygiene*

AT the time of our report last year we had not been advised of the founding of the first organization set up in America specifically for the purpose of organizing, financing, and equipping a museum of hygiene. This institution was incorporated on December 7, 1936, as the Cleveland Museum of Health and Hygiene. This group has prepared a statement of its objectives and is now engaged in developing the necessary basic support.

We are now able to record the founding of the second such organization. This, the American Museum of Health, Inc., was incorporated on December 11, 1937, its principal office being in New York City. The incorporators of the New York organization were members of the Advisory Committee on Medicine and Public Health of the New York World's Fair. This museum expects to obtain the nucleus for its exhibit collection from the medical and public health exhibits which are being developed for that Fair. Mayor LaGuardia has promised the group that it will have a building available for its museum at the conclusion of the Fair, and plans are now being developed in preparation for the formal opening at that time of a museum of hygiene in New York City.

In the meantime, the American Museum of Health has signed a contract with the Fair under which it assumes direct responsibility for a number of exhibits in the Fair. Moreover, all contracts with sponsors of exhibits

in the medical and public health building of the Fair provide that these exhibits shall become the property of the Museum at the end of the Fair.

Our committee, mindful of its basic responsibility to promote and encourage the development of museums of hygiene in the United States, has given considerable support to the New York Museum in the belief that nothing could better assure the development of museums of hygiene in America than the example that would be set by the establishment of one such outstanding museum. The committee's experience with reference to Chicago where adequate advance preparation might have made possible the immediate creation of a hygiene museum in that city at the end of the Century of Progress, has led it to recognize that the advent of the New York and San Francisco Fairs offered unusual opportunities for the establishment of such museums in one or both of these cities.

Members of our committee have therefore been active in connection with the medical and public health exhibits at both Fairs. Although it is reported that the museum committee of the Western Branch of the Association has been practically dissolved, the health education section of that branch continues its interest and is hopeful that at the end of the San Francisco Fair it may be able to assemble some of the public health exhibits there as a nucleus for a museum on the West Coast.

While there was no organization ready to utilize the Century of Progress Exposition to the fullest extent in

* Seventh Annual Report of the Committee presented to the Governing Council

creating a museum in Chicago, a number of exhibits from that exposition have for the present been housed in the Museum of Science and Industry, founded by Julius Rosenwald. With this nucleus, the medical wing of about 35,000 square feet is rapidly being filled. This is a first class exhibit operating under trained direction and, serving as a demonstration, it may lead to the creation of an independent museum of hygiene.

In the meantime a further demonstration of the popular interest of such exhibits has been furnished by the health exhibit at the New York Museum of Science and Industry, which was opened in November, 1937. This exhibit occupies approximately 10,000 square feet of floor space and since its opening the average monthly attendance at this museum has been approximately 40,000. The principal item in this health exhibit is the comprehensive collection of material purchased by the Oberlaender Trust from the German Hygiene Museum in Dresden, in the selection of which our committee aided. This material of the Oberlaender Trust is without doubt the outstanding collection of health exhibit material in America at the present time. It is expected that most of it will be on display at the New York World's Fair in the summer of 1939.

The committee notes with satisfaction the rapidly growing interest in health exhibits. Members of the committee and its staff have been invited to present the museum idea before various groups, and there is a small but growing number of inquiries received at the office of the committee.

Since our last report the committee has issued two publications. The first,

referred to in our last report as then in preparation, is the study of the health museum idea prepared for the committee by Dr. Benjamin C. Gruenberg. The second is the proceedings of the conference held under the auspices of the committee at the last meeting of the American Public Health Association. At that conference there were presented the original drawings and floor plans for an ideal health museum, which plans were based on a functional study of such an institution made by the New York architect, I. Woodner-Silverman. A scale model of this museum is on display among the scientific exhibits at this meeting in Kansas City. This model is a part of the general exhibit of the Museum Committee.

The committee has enjoyed this year a continuation of the grant from the Carnegie Corporation. This, together with funds and services which have been made available by the New York World's Fair, have enabled the committee to carry on a constantly growing program.

Looking to the future, we believe the time is not far off when this program of museums of health for America will be able to stand on its own feet, supported by a group of museums throughout the country. Pending that time, and to insure its arrival, we recommend a continuation of this committee.

LOUIS I. DUBLIN, *Chairman*
VICTOR G. HEISER
KENDALL EMERSON
BERTRAND BROWN
EVART G. ROUTZAHN
C.-E. A. WINSLOW
GUY S. MILLBERRY
SALLY LUCAS JEAN
HOMER N. CALVER, *Secretary*

School Health Policies*

Child Hygiene Section

THE Section recommended that the report be published in the *Year Book* of the Association and that the report be referred to the American School Health Association for further consideration, discussion, and confirmation. It was recommended that an effort be made to determine a consensus of current opinion upon the policies outlined in this report.

Because of limited space this report cannot be printed. The following is a brief abstract. It is hoped that the American School Health Association can arrange for publication.

SCHOOL HEALTH POLICIES

This statement of school health policies is planned—(1) To delineate the responsibilities of School Health programs—and (2) To relate the school health program to the health programs or health activities of other groups. In other words, it is an attempt to outline those things which schools should and should not do in the field of health.

The report emphasizes that "the school health service program may satisfactorily be administered by either a Board of Education or a Board of Health. . . . In either type of administration, specific important responsibilities will be delegated to teachers and from many points of view, the teacher must be considered a key person in school health activities.

The teacher will need the assistance of specialists in the health field . . . nurses, physicians, etc. . . . and these can assist the teacher regardless of the department of civic government to which they are responsible."

The report points out "that the school health program is only one of many activities directed toward the preservation and improvement of child health and that it should be closely coördinated with all other community health activities."

"For purposes of discussion and simplification, the committee considers all school responsibilities for pupil health under 8 headings:

1. To provide a *Healthful Environment*—This includes attention to the arrangement of the school program and the social and emotional tone of the classroom as well as attention to school sanitation.

2. To have a *Planned Program for the Care of Accidents* occurring at school and for cases of sudden sickness.

3. To have a *Planned Program for Assisting in the Community Program of Contagious Disease Control*.

4. To *Teach Pupils Habits and Attitudes* conducive to the maintenance of good health, and to *Facilitate the Accumulation of Scientific Knowledge* relating to the causes of disease, the way certain diseases are spread, and the known methods of preventing disease from the point of view of both individual and community health.

5. To *Encourage the Periodic Health Examinations* of pupils, to develop a plan whereby such examinations will be obtained, and to keep a cumulative record of the findings and recommendations.

6. To *Give Special Attention to Those in Need of Medical or Dental Care* through a follow-up program which will, where necessary, guide pupils and parents to sources of medical and dental treatment.

* Excerpt from a Report of the Committee on School Health Service, presented to the Section. The full report may be obtained in mimeographed form from the Chairman, Charles C. Wilson, M.D., 145 High Street, Hartford, Conn.

7. To *Provide Special Education Programs* adapted to the needs of handicapped pupils.

8. To *Provide Supervision and In-service Training for Teachers* and to place specific responsibility in the hands of some person especially qualified in education and in school health work for coördinating all school health activities and for relating these to community health programs.

"Policies change with time. What is considered good policy at the present time may not coincide with what was recommended several years ago, and the

future will unquestionably modify present views. The committee is aware of the transient nature of policies, but believes that progress and understanding are dependent on clear-cut statements of viewpoints. Through, specific statements of policy it hopes to contribute to the progress of school health programs."

CHARLES C. WILSON, *Chairman*

MARY ELLA CHAYER

HAROLD H. MITCHELL

Analyzing Frozen Desserts and Ingredients*

Food and Nutrition Section

THE first year of the Frozen Desserts Committee was occupied mainly with organizing the committee and determining what to do and the best way of doing it. Since the committee is a joint one working with a similar committee from the Laboratory Section of the Association, it was necessary to work out certain policies to produce a harmonious joint committee. This has been done to the entire satisfaction of all members on both committees so that the work is now progressing in a very satisfactory way.

BROAD FIELD IN FROZEN DESSERTS

It is fortunate that the Association had the vision to create a committee to study the subject of frozen desserts, since it is not only an increasingly important field but also a very broad one. The scope of the work as comprehended by your committee includes not only all the frozen desserts, but also all the ingredients which enter into their manufacture. Furthermore, we are attempting to formulate standard methods for the bacteriological, chemical, and physical examination of the finished product, as well as the ingredients used in making the finished product.

We are certain that those familiar with the field will agree that this is an ambitious program and will take considerable time and work to formulate

standard methods covering so many products. When one considers the years of time and the vast amount of work that have been expended in producing Standard Methods for Milk and Water Analysis, he begins to comprehend the task before us. It is for this reason that we beg your patient indulgence.

ORGANIZATION OF COMMITTEE

The Frozen Desserts Committee as now organized, has three members from the Laboratory Section—F. L. Mickle, A. H. Robertson, and James Gibbard; and three members from the Food and Nutrition Section—F. W. Fabian, J. H. Shrader, and M. E. Parker. Five of these members are referees for the following:

- I. A. H. Robertson, *Referee*, Bacterial Analysis—Finished Products
- II. F. W. Fabian, *Referee*, Bacterial Analysis of Ingredients
M. J. Prucha, *Associate Referee*, Bacterial Analysis of Flavors, Colors, Extracts, etc.
P. A. Downs, *Associate Referee*, Bacterial Analysis of Condensed and Evaporated Milk
P. S. Prickett, *Associate Referee*, Bacterial Analysis of Dry Milk
H. H. Hall, *Associate Referee*, Sugars and Sweetening Agents
P. H. Tracy, *Associate Referee*, Bacterial Analysis of Fruits and Nuts
L. H. James, *Associate Referee*, Eggs and Egg Products
- III. James Gibbard, *Referee*, Bacterial Analysis of Stabilizers

* Excerpt of the Joint Standard Methods Committee of the Food and Nutrition and Laboratory Sections (transferred to the Food and Nutrition Section).

IV. J. H. Shrader, *Referee*, Chemical Analysis of Frozen Desserts and Their Ingredients

V. M. E. Parker, *Referee*, Sediment Testing for Frozen Desserts

E. C. Thompson, *Associate Referee*, Sediment Testing of Condensed and Dried Milks

George F. Stewart, *Associate Referee*, Sediment Testing of Egg Products

NOTE: Preliminary reports of all the referees and associate referees are now in the hands of the committee. These reports will be edited and made uniform.

PLAN OF PROCEDURE

At the last meeting of the committee, it was decided that when Standard Methods had been formulated by a referee or associate referee, they should be approved by the Joint Committee if found satisfactory and mimeographed copies sent to as many laboratories as possible for trial and criticism. At the end of this period they would be revised and published in the *Year Book* of the Association for further trial and criticism. After which they will be published as Standard Methods, either

tentative or official, presumably as a part of Standard Methods for the Examination of Dairy Products. This may seem a long and to some an unnecessary procedure but the committee feels that this is the only safe way to get satisfactory methods.

Many of the methods are already written and will soon be mimeographed and ready for distribution during the coming year. The committee asks your wholehearted coöperation in this matter. If you are doing this kind of work and do not receive copies of the methods during the coming year, please write for them. If you do receive copies of the methods, please try them out and write your suggestions and criticisms.

F. W. FABIAN, *Chairman*

J. H. SHRADER

M. E. PARKER

Representatives from the Laboratory Section

FRIEND LEE MICKLE, *Chairman*

JAMES GIBBARD

A. H. ROBERTSON

Status of Pasteurization of Milk and Milk Products*

Food and Nutrition Section

SEVERAL reports of this committee in recent years have in part dealt with the subject of pasteurizing milk and milk products. Within the past few years, however, considerable has been added to our knowledge concerning the effects of pasteurization on milk, the efficiency of pasteurizing equipment, and the satisfactory control of the pasteurization process. For these reasons the members of your committee have decided to confine their report to a discussion of the present status of pasteurization.

The pasteurization process is without doubt the most important single factor from the public health standpoint in the handling of milk and milk products. The necessity to insure the safety of our milk supplies through pasteurization is no longer questioned by the vast majority of doctors, public health workers, and sanitarians. In this respect opinion has changed rapidly in the past few years. The general acceptance of the practice is clearly portrayed by the fact that, in all cities with a population over 10,000, an average of at least 88 per cent of the milk supply is pasteurized.¹ That the safety of raw milk, however carefully safeguarded, must be questioned is tacitly implied in the action of the American Association of Medical Milk Commissions. At their annual meeting in June, 1935, that as-

sociation voted unanimously to approve the sale of "Certified Milk-Pasteurized." Certified Milk-Pasteurized has been sold in several of our cities since 1935.

Pasteurization has been upheld in the courts in several instances, hence the power of municipalities and states to enforce compulsory pasteurization has been on several occasions legally recognized.²

Objections to the pasteurization of milk, however, are still voiced. Pottinger,⁴⁵ writing in the magazine, *Certified Milk*, presents the commonly expressed criticisms of heat-treated milks and gives data from his case records in an attempt to show evidence of the value of raw milk over heat treated milk.

Many tabulations of milk-borne epidemics of various diseases appear in the literature which show that such outbreaks of disease are almost always confined to raw milk. When disease has been transmitted through milk said to be pasteurized, and a study of processing methods has been possible, it has invariably been found that the milk was not held at the proper temperature, or for a sufficient time, or was contaminated after pasteurization. Milk-borne disease epidemics are often spectacular with many cases developing within a few days and some often resulting in deaths. This may impress the public and emphasize the need for carefully pasteurizing all milk. How-

* Report of the Milk and Dairy Products Com-

ever, when considering the public health value of pasteurization, the reduction in infant morbidity and mortality in areas where the process is in vogue, which is usually marked, should also be included in the study. Admitting these facts, let us consider the effect of the pasteurization process on the food value of milk.

FOOD VALUE OF RAW VERSUS PASTEURIZED MILK

The comparative food value of raw and pasteurized milk has been a controversial subject in past years. Fortunately the results of a sufficient number of researches have been published on this subject in recent years so that a satisfactory conclusion can now be drawn. Studies with experimental animals, too numerous for enumeration in this report, have been conducted here and abroad. These experiments invariably indicate that there is no difference in food value between raw and pasteurized milk. It is of much greater significance that this conclusion is borne out by studies with children. The most significant studies of the growth of children on raw and pasteurized milk have been those of Leslie C. Frank,³ who tabulated weight and height data for 3,700 children, and Leighton and McKinley,⁴ who studied the growth of 20,000 school children in Lanarkshire, Scotland. These studies show that children on pasteurized milk thrive fully as well as those on raw milk.

Of more than passing interest are two studies with calves which were carried out in England.^{5,6} Cow's milk is the natural food of the calf. Hence, the effect of heating milk for calf feeding should be of especial significance. The outcome of both experiments was similar in that no difference was found in growth and performance between the groups of calves fed raw milk and those fed pasteurized milk.

EFFECT OF PASTEURIZATION ON CERTAIN DIETARY ESSENTIALS

A considerable amount of work has been reported regarding the effect of pasteurization on the vitamins of milk. It is generally agreed that the process does not lower the vitamin A, carotene, or vitamin D content of milk.^{7, 8, 10, 42} However, pasteurized milk may contain less vitamin B (B_1), C, and G than raw milk. Dutcher⁹ found that the maximum destruction of vitamins B and G during pasteurization to be about 38 per cent, but states further, "under carefully controlled plant operation need not be as great as indicated above." However, Krauss, *et al.*, report that 25 per cent of the vitamin B is destroyed during pasteurization but vitamin G is unharmed. Kon¹³ found a 20 per cent destruction of vitamin B during pasteurization.

Since the vitamin C content of raw milk is low, it is impossible to judge accurately through bio-assays the effect of the pasteurization process on this vitamin. For several years it was generally conceded, however, that the vitamin was almost entirely destroyed by pasteurization. With the recent introduction of the titration method for ascorbic acid in milk, a technic for measuring accurately the vitamin C content has become available, and studies are being made by this method to make comparatively accurate determinations.

In the absence of copper contamination from the equipment, the loss of vitamin C by the titration method has been found to be much lower than anticipated. Two investigators, Fellers⁷ and Kon,⁸ report a loss of at least 20 per cent of vitamin C due to oxidation of ascorbic acid during pasteurization. Sharp, however, has shown that the presence of copper and time of storage have much more effect on the extent of oxidation of ascorbic acid than heating the milk.¹¹ Sharp draws the following

conclusions from this work, "It is commercially feasible to pasteurize milk by the holder method and maintain essentially as high an ascorbic acid content as that of raw milk at the same age. This removes the main nutritional objection of pasteurized milk."

Unless light is excluded the vitamin C content of milk decreases during storage, the rate depending on the light intensity. The recent work of Kon and Watson¹² shows that milk may contain two forms of ascorbic acid—the reduced and the reversibly oxidized forms. Milk taken directly from the udder without exposure to light contains only the reduced form of ascorbic acid and can be pasteurized without loss of the vitamin, in the absence of copper; the reversibly oxidized form of ascorbic acid is formed by the action of light upon the milk and is affected by pasteurization.

Guthrie, Hand, and Sharp⁴⁶ have found that the vitamin C content can be retained completely in milk if the air is removed from the fresh milk by placing it under partial vacuum. Raw, pasteurized, and pasteurized milk containing copper were stored for periods of 7 days with no measurable loss of vitamin C when treated in this manner.

It is possible that the wide variations previously reported regarding the effect of processing of milk on the vitamin C content may have been caused by the length of exposure of the milk samples to light before the titrations for ascorbic acid were completed.

References regarding the effect of pasteurization on the digestibility of calcium in milk are controversial. Mattick and Hallett¹⁴ report a 2 per cent loss in calcium due to pasteurization. Daniels,¹⁵ Magee,¹⁶ and Kramer¹⁷ also believe there is a slight reduction. However, Courtney¹⁸ found no discernible difference, while Krauss,¹⁹ and Kon⁸ found that calcium and

phosphorus both were as readily available in pasteurized as in raw milk.

Though there is evidently some loss of vitamins B, C, and G due to pasteurization, the fact remains that, with both children and experimental animals, no differences in food value have been found between raw and pasteurized milk. This indicates that milk in the quantities usually ingested contains more than enough of these essentials or is supplemented sufficiently by the other foods which make up the diet of the average child.

PASTEURIZATION OF MILK PRODUCTS

Less information is available concerning the extent of pasteurization of sweet cream for table use than is the case with milk. However, it is reasonable to assume that the process is as widely used with market cream as with milk. In general, slightly higher temperatures are employed with cream than with milk. In pasteurizing milk by the holder method, temperatures of 142 to 145° F. with a 30 minute holding period are most frequently practised. As for cream, at least 145° F. is maintained, and frequently temperatures as high as 150° to 155° F. are used to enhance the keeping quality, since the cream is frequently older than milk when consumed.

Evaporated, condensed, and powdered milk products receive during processing temperature treatments in excess of those used in ordinary pasteurization. Hence, from the public health standpoint they must be considered to have received at least the equivalent of pasteurization. The milk used in these products is invariably heated to temperatures higher than 145° F., often near the boiling point before it is condensed. Canned evaporated and condensed milks are also heated to relatively high temperatures after canning to insure satisfactory keeping proper-

ties and, therefore, are made bacteriologically safe.

Reference to the report of this committee for 1937¹⁹ shows that a fairly large number of disease epidemics have been traced to both butter and cheese. A considerable quantity of "farm" butter made from raw cream is still being sold and much of the cheese being consumed has been made from raw milk. The committee¹⁹ advocated the requirement that all milk and cream used in the making of butter and cheese be properly pasteurized. Not only is this sound from the public health point of view but is good commercial practice. The keeping quality of butter is enhanced when cream used in its manufacture is pasteurized. Since the process largely inactivates the enzyme, lipase, oxidation of the butter fat is less likely to occur. Pasteurization of milk for cheese making has been advocated frequently within the industry because a more uniform quality can be maintained, less spoilage occurs, and a better yield is realized. This has been shown by the work of several investigators, as Price,²⁰ Phillips,²¹ Tuckey,²² and Reid.²³

The optimum temperature for the pasteurization of ice cream mix has been a controversial question. A previous report of this committee (1929) indicated that 143.5° F. for 30 minutes was adequate to insure pasteurization of the mix.²⁷ Since that time there has been an increasing number of bacteriologists and public health workers who advocate a temperature sufficiently high to destroy *E. coli*. The absence of *E. coli* in ice cream is considered by some as an index of effective pasteurization, and by others as an indication of sanitary methods during handling and dispensing. Fabian and Coulter,²⁸ Meyers and Sorenson,³⁰ and Yale³¹ have shown that pasteurizing at 155° F. for 30 minutes will destroy *E. coli*. It has also been shown that

the amount of sugar present has a protective action for bacteria.^{28, 29} There has been a tendency in recent years to increase the sugar content of ice cream. For these reasons the ice cream manufacturer has gradually increased the temperature of pasteurization so that, at present, 155° to 165° F. for 30 minutes is common practice. These temperatures are adequate to destroy any pathogenic bacteria which might be present in the ice cream mix.

CHANGES IN PASTEURIZATION EQUIPMENTS AND METHODS

There has been a steady improvement in the efficiency of pasteurization equipment. In much of the earlier equipment faulty design and construction left channels through which viable pathogenic bacteria could pass, and improper construction often resulted in unnecessary physical changes in the product. Though considerable progress has been made in the engineering of pasteurization equipment, as Holmquist and Tiedeman point out in a recent survey of the problem,²⁴ there is still need for further improvement. Metals used in pasteurization have been studied and new alloys developed which are more suitable for milk-contact surfaces.

There has been a gradual change in pasteurization methods since the commercial pasteurization of milk began. High-temperature-short-time methods were commonly practised at that time. However, such pasteurization equipment was condemned by public health officials because proper control of the process seemed impossible. The development in the past few years of sensitive control devices and efficient milk heaters has again revived interest in high-temperature-short-time methods. As a result of these recent developments, plate heater pasteurizers and electric pasteurizers have been tested by public health officials in a number of states and accepted by some. High-tempera-

ture-short-time pasteurization has been reviewed recently by several investigators, among them both Yale²⁵ and Putnam.²⁶

TESTS FOR EFFICIENCY OF PASTEURIZATION

Since the entire quantity of milk or milk product being pasteurized must be heated to the desired temperature and held for the required time, if the process is to reach its greatest usefulness, some satisfactory way of determining the efficiency of pasteurization is highly desirable. In the past no such test has been available. Hence milk sanitarians have found it necessary to determine the efficiency of the process by inspecting pasteurizing equipment, thermometers, and records of temperature and time-holding recording devices.

Some laboratory tests have been suggested for determining pasteurization efficiency. A modification of the Rothenfusser test has been advocated but was found to be lacking in sensitivity.³² The standard plate count and tests for coliform organisms have also been found to be unsatisfactory.³³ The measurement of the activity of the enzyme, amylase, has been found to furnish a fair index to the temperature treatment of the milk,³⁴ although the test is not sufficiently sensitive for control work.³⁵ However, the phosphatase test, developed by Kay and Graham,³⁶ has been found to be sufficiently sensitive to indicate minor changes in the temperature and time of pasteurization, as well as contamination with very small amounts of raw milk.^{33, 35} The tremendous interest shown in this test is evident by the space given to it on the program of this Association for 1938, at recent meetings of milk sanitarians and dairymen, and by numerous articles in our scientific journals and trade papers.

The phosphatase test has been modi-

fied by Gilcreas and Davis³⁵ of the New York State Department of Health, and by Scharer of the New York City Department of Health.^{41, 36} A more rapid test was needed than the original Kay and Graham method or the modification suggested by Gilcreas and Davis. For routine plant or laboratory work where a large number of samples must be examined a relatively simple and rapid method is essential. The rapid field test of Scharer,⁴¹ however, was not sufficiently sensitive to indicate small but significant differences in temperature and time of holding milk during the pasteurization process. Further developments in the method recently worked out by Scharer³⁶ presumably have increased considerably the sensitivity of the rapid phosphatase test which he has formulated. Different color standards for the phosphatase test than those used by Gilcreas and Davis³⁵ have been suggested by Spencer,³⁷ Boynton,³⁸ and by Scharer.³⁶

The phosphatase test is being used satisfactorily in determining the efficiency of the pasteurization of table cream. A modification of the test has been applied to butter by Brown and Parfitt,³⁹ who found when examining samples of commercial butter, about 31 per cent of the butters appeared not to be pasteurized. Kay and Neave⁴³ also have studied the modification of the phosphatase test for use with butter as well as cheese. Hahn and Tracy⁴⁰ found that the phosphatase test can be used successfully with certain limitations to determine the pasteurization of ice cream mix. However, a number of flavoring materials appear to carry free phenol, hence the test cannot be applied to finished ice cream. The work of Krueger⁴¹ substantiates that of Hahn and Tracy.

It should be borne in mind that the phosphatase test, however useful, is not an official method. In the near future this Association should appoint a

special committee to study the phosphatase test and suggested modifications, with the purpose of proposing a standard procedure for adoption by the American Public Health Association as an official test for the pasteurization of milk.

Your committee has attempted in this report to review the many developments within recent years which have added to our knowledge of the subject of the pasteurization of milk and dairy products. It is our hope that this resumé will serve the purpose intended, which is to indicate to the reader the present status of pasteurization.

REFERENCES

1. Editorial. *A.J.P.H.*, 27:920-21 (Sept.), 1937.
2. Tobey, James A. *Internat. A. Dairy & Milk Inspect. Rep.*, 23:109 (Oct.), 1934.
3. Frank, Leslie C., et al. *Pub. Health Rep.*, 47:39 (Sept. 23), 1932.
4. *J.A.M.A.*, 96:1243, 1931.
5. Wilson, Minett and Carling. *J. Hyg.*, 37:243, 1937.
6. Wilkie, Edwards, Fowler and Wright. *J. Dairy Res.*, 8:311, 1937.
7. Fellers, C. R. *A.J.P.H.*, 25:1340 (Dec.), 1935.
8. Editorial. *Nature*, 140:389 (Oct. 9), 1937.
9. Dutcher, Guerrant and McKelvey. *J. Dairy Sci.*, 17:455, June, 1934.
10. Krauss, Erb and Washburn. *Ohio Agri. Exper. Sta. Bull.*, 518 (Jan.), 1933.
11. Sharp. P. F. *Science*, 85:461 (Nov. 20), 1936.
12. Kon and Watson. *Biochem. J.*, 30:2273, 1936.
13. Kon, et al. *Milk and Nutrition*. Part 1. Shinfield: *Nat. Inst. Res. Dairying*, 1937.
14. Mattick and Hallett. *J. Agri. Res.*, 19:452, 1929.
15. Daniels and Laughlin. *J. Biol. Chem.*, 44:381, 1920.
16. Magee and Harvey. *Biochem. J.*, 20:885, 1926.
17. Kramer, et al. *J. Biol. Chem.*, 79:283, 1928.
18. Courtney, A. M. *Canad. M.A.J.*, 17:919, 1927.
19. Supplement to *A.J.P.H.*, 28:66, Feb., 1938.
20. Price, W. V. *J. Dairy Sci.*, 10:155 (Mar.), 1927; 10:448 (Sept.), 1927; and 11:69 (Jan.), 1928.
21. Phillips, C. A. *J. Dairy Sci.*, 11:292 (July), 1928.

22. Tuckey, C. L. *Nat. Butter & Cheese J.*, 27:22 (Dec. 10), 1936.
23. Reid, W. H. E. *Nat. Butter & Cheese J.*, 27:26 (Sept. 25), 1936.
24. Holmquist and Tiedeman. *J. Milk Tech.*, 1:11 (Oct.), 1937.
25. Yale, M. W. *Milk Plant Month.*, 23:28 & 32, Mar. and Apr., 1934; *Tech. Bull.*, 207, N. Y. State Exper. Sta., Feb., 1933.
26. Putnam, G. W. *Milk Plant Month.*, 24:26 (Dec.), 1935.
27. Report of Committee on Dairy Products and Eggs. *A.J.P.H.*, 20:492, 1930.
28. Fabian and Coulter. *J. Dairy Sci.*, 13:273, 1930.
29. Fay, A. C. *J. Agri. Res.*, 48:453, 1934.
30. Meyers and Sorenson. *Proc. Int. Assn. Ice Cream Mfrs.*, 2:7, 1936.
31. Yale, M. W. *Proc. Int. Assn. Ice Cream Mfrs.*, 2:17, 1936.
32. Gould, B. S. *J. Dairy Sci.*, 15:230 (May), 1932.
33. *A.J.P.H.*, 28:629 (May), 1938.
34. Leahy, H. W. *Int. Assn. Dairy and Milk Inspectors Rep.*, 23:93, Oct., 1934.
35. Gilcreas and Davis. *Internat. A. Milk Sanitarians Rep.*, 25:15, Oct., 1936.
36. Scharer, H. J. *Milk Tech.*, 1:35 (July), 1938.
37. Spencer, H. L. *Milk Dealer*, 27:66 (Mar.), 1938.
38. Boynton and Nelbach. *J. Milk Tech.*, 1:8 (May), 1938.
39. Brown and Parfitt. *J. Dairy Sci.*, 21:149 (May), 1938.
40. Hahn and Tracy. *J. Dairy Sci.*, 21:153 (May), 1938.
41. Scharer, Harry. *J. Dairy Sci.*, 21:21 (Jan.), 1938.
42. McHenry, E. W. *Canad. Pub. Health J.*, 29:295 (June), 1938.
43. Kay and Neave. *Lancet*, 1:1516, 1935.
44. Krueger, P. F. *A.J.P.H.*, 28:320 (Mar.), 1938.
45. Pottenger, F. M., Jr. *Certified Milk*, 13:3 (July), 1938.
46. Guthrie, Hand and Sharp. Paper presented before the eastern division, A.D.S.A., Sept. 19, 1933.

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Present Status of Clinical Tests for Vitamin Deficiency*

Food and Nutrition Section

MOST estimates of requirement for vitamins today are based on determinations of the minimum amount necessary to prevent visible and recognized symptoms of deficiency, plus a factor of safety to cover individual variations. The size of the factor of safety varies with the viewpoint of the estimator. Such estimates when applied in dietary surveys supply a means for detecting gross deficiency but they do not tell adequacy, if we mean by the latter term amounts necessary to provide optimum needs, optimum health. Neither do they take into account the clinician's problem of how to detect and to follow treatment in an individual case.

For real determination of individual needs; for check on the success or failure of a given vitamin therapy regimen, the clinician needs quick and quantitative tests that can be applied to the patient. Such tests are developing and, while still imperfect, they give promise of what the clinician needs, of taking the guess work out of vitamin therapy.

In view of the importance of these tests it seemed best to the committee to present this year a summary of those tests that are in process of development and some of the problems to be solved to make them more efficient.

In general, two factors, at least, determine the individual's needs for

vitamins; the amount ingested and the amounts in storage in the body. To meet this requirement there is coming into general use the test dose method; the giving of large initial doses and determining from the amounts excreted the state of saturation of the individual. For this purpose it is essential that we have means of measuring the blood content of the vitamin as an index of tissue condition and the fecal and urine content of the vitamin to estimate amounts excreted. And even when these data are available we may still have problems of vitamin fate to determine, due to destruction or conversion of the substances in the body.

CLINICAL TESTS FOR VITAMIN A DEFICIENCY

1. *Dark Adaptation Tests*

It is generally agreed that hemeralopia is one of the earliest indications of vitamin A deficiency. The explanation is now shown to be that the regeneration of visual purple necessary to acuity of vision requires a continuous supply of vitamin A.

There are many devices that have been developed to measure this phenomenon, ranging from the use of a watch with a luminous dial to the complicated biophotometer of Frober-Faber, the adaptometer of Feldman, and the machine of Hecht. All, however, accomplish the measurement by first bleaching the visual purple in the rods of the retina with a bright light

* Report of the Committee on Nutritional
Requirements.

and then determining the time necessary to recover clear vision. That the methods truly measure rate of regeneration of visual purple and hence, indirectly the eye's supply of vitamin A is agreed. The test has been used by Jeans¹ who has reported that with the biophotometer he was able to show that an 11 year old boy required 3,000 International units of A per day to prevent hemeralopia. Jeghers,² working with adults and this machine, estimated that the daily requirement was at least 4,000 units of A per day and recommended 6,000 to cover individual variations. On the other hand, Feldman and Ezickson,³ while showing correlation between low dark adaptation tests and cases of urinary lithiasis, failed to correct the hemeralopia in these cases by feeding large amounts of vitamin A. And more recently, Isaacs, Jung, and Ivy⁴ go so far as to say: "Far more study is essential before the biophotometer or any similar instrument can be used *per se* for the detection of vitamin A deficiency in the human being."

It is generally conceded that retinal function is of two types: that of the cones, sometimes called photopic or day vision; and that of the rods, similarly sometimes designated as scotopic or night vision.⁵ The rod vision is known to be concerned with chemical changes in the visual purple and the ability to regenerate this pigment quickly is a function of the supply of A brought to it by the blood. Haig, Hecht, and Patek⁶ have recently pointed out a correlation between cone threshold and rod threshold and suggest that the visual violet of the cones may also be involved in vitamin A chemistry.

Those who criticise the present reports of vitamin deficiency as determined by dark adaptation tests do not quarrel with the above theory. They agree that hemeralopia is an early sign

of A deficiency. But some of these critics hold that the tests as conducted today are frequently not satisfactorily controlled to rule out factors other than A deficiency.

These devices were discussed at a recent meeting of the American Institute of Nutrition and while it was agreed that the test is valuable for sorting out individuals with sub-clinical deficiencies and hence valuable to the health worker in indicating need for dietary measures; for precise determination of subnormal A nutrition the test needs standardization in terms of eye physiology. Necessity for controlling the coöperation of the individual under test, methods of controlling light, standard position for the most sensitive portion of the eye, calibration of the instrument, were some of the features suggested as needing attention.

Feldman⁷ has made a special study of the problem and has devised a new form of adaptometer to control some of these factors. He says that the study indicates that there are at least two types of poor dark adaptation:

1. A definite and serious disturbance of rod structure for which there is no known cure
2. A functional type usually due to a deficiency and usually quite amenable to A therapy.

(Ophthalmoscopic examination is essential for excluding type 1.)

In the Feldman instrument, tests are performed in a dark room. The patient is first exposed to a bleaching out light of controlled intensity and during this period the operator is able to determine whether the eyes are kept open during the entire period; pupil opening is controlled by pilocarpine after the method of Derby.⁸ After the exposure light is cut off, the patient fixes his finger at a protuberance on the machine so located that automatically the light is focused on an area of the eye (20 degrees off fovea) where the rods predominate.

The patient reports not only when he sees clearly the lighted image but also the direction of an image which can be shifted by the operator. This feature insures true response of the patient.

There are other control features, but these are given to illustrate how the test is being studied and corrected to eliminate false conclusions. Feldman reports that individuals recognizing the image and giving its direction in 5 minutes or less are normal as to A supply; those requiring more than 5 minutes are abnormal and if the ophthalmoscopic examination does not show eye pathology, are probably examples of A deficiency.

Like most clinical tests the dark adaptation results need correlation with other means of detecting A deficiency. Such correlation is becoming possible by blood examination tests.

2. Blood Vitamin A and Carotene Tests

Carr and Price⁹ in 1926, developed a quantitative method of measuring vitamin A potency from its color reaction with antimony trichloride. Since the blue plates of the Lovibond Tintometer were used in matching the intensity of the color produced the Carr-Price method results are usually expressed in "Lovibond Blue Units." Correlating such tests with spectrophotometric tests and using a highly concentrated A vitamin preparation British workers reported that they got an "E" value of 1,600 and a blue unit value of 80,000; a ratio of 1/50. Holmes and Corbett¹⁰ with their pure crystalline vitamin A got an "E" value of 2,000 and a blue unit value of 100,000, the same ratio as the British workers. The Holmes-Corbett product bioassayed at 4,000,000 International units per gram. On that basis a blue unit value of 1 would correspond to a unitage of 40 I.U. per gm.

A method of applying the Carr-Price

reaction to blood plasma to detect its vitamin A content has been worked out and used for estimating vitamin A content per 100 c.c. Unfortunately, when one uses this test with vitamin A sources other than the pure or highly concentrated A materials, there are substances that interfere with the test. The color reaction is also transitory and it is difficult to detect the highest intensity attained. For that reason it is probably impossible as yet to use a conversion factor such as 40 I.U. per 1 blue unit of A found in a natural or biological source and be sure that it gives the absolute quantity of A in units. Use of the photoelectric colorimeter, such as devised by Evelyn¹¹ and by others, helps to make the readings more accurate. However the test does give relative results and is useful in detecting whether vitamin A intake is deficient and whether the therapy is being successful in getting the vitamin into the blood stream.

Using this method Menkin¹² has reported variations in blood plasma ranging from 0 to 8.4 blue units per 100 c.c. Eddy, Mackie, and Bach¹³ examined 38 apparently normal individuals before and after breakfast with the results shown in Table I.

Data	TABLE I	
	Before Breakfast	After Breakfast
No. cases examined	38 (same individuals) 38	
Ave. blue units per 100 c.c.	2.07	2.40
Range	1.0-3.3	1.1-4.4
Standard deviation	.05	.075

May has used the test rather extensively but as yet there is no apparent agreement as to what blood value constitutes a normal or a subnormal condition. We also have as yet little data on the correlation of this test with the dark adaptation test. Such data, when forthcoming, will help to clarify both means of estimating A deficiency.

BLOOD CAROTENE TESTS

Carotene also gives a blue reaction with antimony trichloride and in separating the vitamin A from the carotene values this must be taken into account. Carotene also, because of its intense yellow color may be estimated colorimetrically by extraction and comparison with standards of crystalline beta-carotene, or with dichromate solutions or with the yellow plates of the Lovibond Tintometer. When the latter are used as reference, results are given in "Yellow Units." Ferguson¹⁴ has worked out a curve for converting yellow unit values into milligrams of carotene which may be used in this test.

Data on blood carotene content are a little more extensive than on vitamin A values. Clausen¹⁵ in 1933 used this test to determine the effect on infection of the vitamin A potency of the blood. He states that he found the normal carotene level in children over 2 years of age to be fairly constant at .08 mg.%. Heyman¹⁶ using the method of Connor¹⁷ showed that the blood carotene content of diabetics was definitely higher than that of normal individuals. He gives these values for 7 normal healthy children: .08, .08, .08, .152, .140, .421, .182 mg.%. Connor himself¹⁷ reported that 3 c.c. of plasma is enough for the test and that he got from three normal persons .0, .04, .07 mg.% as against .05 to .16 mg.% in diabetics. He also quotes Van den Bergh, *et al.*¹⁸ as finding .4 to 1.34 mg.% in normal individuals and .45 to 1.9 mg.% in diabetic blood. Ralli, *et al.*¹⁹ report the fasting value for 4 normals as .145 mg.% against .145-.200 mg.% in 4 diabetics. Kaufmann and Drigalski²⁰ report estimation of carotene in 1,000 cases. They found 85 per cent to show less than .01 mg.%; of the other 15 per cent, the variation was to a maximum of .270 mg.%.

Using the same individuals who took

the vitamin A test Eddy, Mackie, and Bach¹³ got the results shown in Table II.

TABLE II

<i>Data</i>	<i>Before Breakfast</i>	<i>After Breakfast</i>
No. cases	38	38
Ave. yellow units	.83	.97
Range	.3-2.7	.5-4.1
Standard deviation	.043	.06

Using the Ferguson curve to translate the yellow units into milligram per cent, the results show an average fasting value of .045 mg.% against an after breakfast average of .052 mg.%.

Correlating these tests with the A results they seem to justify the following conclusions:

1. Carotene content is not only usually less than A content but it is less variable.
2. There is no constant relation or ratio between carotene and A content of the blood.
3. Food intake produces a more immediate effect on the blood A content, affects carotene level less.
4. Single determinations are probably misleading in estimating the individual's saturation with A or carotene and repeated estimations of fasting levels on successive days probably give a truer picture of condition.

These conclusions appear to be supported by the observations of others²¹ who have reported on this test.

These tests are applicable to urine and have been made. There are few data on fecal tests. In general it appears that the normal person excretes practically no A in the urine. When such a test is positive, it indicates a serious condition in the patient. Cancer cases and tuberculous and general infection cases have shown urinary elimination of the vitamin.

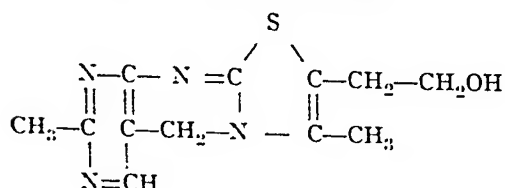
The value of the test in following vitamin A therapy was strikingly illustrated by one ulcerative colitis case of Eddy and Mackie. This individual had been receiving 39,900 units of A by mouth for a considerable period with absolutely no rise in blood A. The

patient was put on topical application of cod liver oil (3 tablespoons twice a day rubbed into the chest). In 3 days, the blood A began to rise, proving beyond doubt the blockage of the path of absorption from the gut and incidentally indicating another route possible to restore blood supply. For following vitamin A therapy, the test has already proved its value.

CLINICAL TESTS FOR VITAMIN B₁ DEFICIENCY

In this field the most widely studied test is that based on a conversion of thiamin into thiochrome, the latter having a blue fluorescence whose intensity is measurable by colorimetric methods.

Formula for Thiochrome



This compound is producible by the action of potassium ferricyanide on thiamin or on the co-carboxylase, thiamin-pyrophosphate.

The principles involved in making this test are: (1) the extraction of the B₁ from the urine by an adsorbent, then the removal of the thiamin from the adsorbent by a suitable reagent.

Then conversion of the thiamin into thiochrome, production of fluorescence by ultra-violet irradiation and measurement of the intensity in contrast to standard solutions of thiochrome.²² In his adaptation of the test, Pyke²³ used the Cohen²⁴ fluorimeter.

In the hands of Westenbrink, Goudsmit, Jansen and coworkers²⁵ this test has given very satisfactory results in the determination of the B₁ content of urines. They adsorb the vitamin from a small sample of urine (about 6 c.c.) which is then diluted to 50 times with pH3 water and the B₁ removed with franconite (special form of Fullers earth). A feature of their recovery of B₁ from the franconite without destruction is their use of a small amount of methyl alcohol with the alkali and the prevention of oxidative changes by bubbling CO₂ or N₂ during the treatment. The thiochrome, when produced by the alkali ferricyanide, is gotten into solution in isobutanol. Jansen has designed a special fluorimeter after the Cohen type but with a filter between the activating lamp and the tube of thiochrome that concentrates the ultra-violet rays and another filter between the fluorescing thiochrome and the photoelectric cell so that the latter is affected solely by the visible rays of the fluorescing thiochrome.

The Dutch workers have reported results such as shown in Table III, as

TABLE III

Diets	Dates 1937	Gamma of Thiamin Excreted		
		9 A.M.-9 P.M.	9 P.M.-9 A.M.	24 Hr. Total
1. Normal plus 5 mg. thiamin given 1 mg. @ 9 A.M., 1 P.M., and 6 P.M.	4/20-21			
2. Ditto	4/21-22	290	170	460
3. Normal diet without the added thiamin	4/22-23	390	160	550
4. Ditto	4/23-24	80	40	120
5. Normal diet plus 5 mg. thiamin given 1 mg. @ 9 A.M., 3 P.M., 9 P.M.	4/24-25	30	10	40
		160	160	320

evidence of the value of the test in following changes in B_1 intake.

Their results check with those of Helmer.²⁶ Harris and Leong²⁷ have reported the normal B_1 excretion as from 12 to 13 I.U. daily and an amount less than 12 indicating inadequacy of B_1 intake. It is now generally agreed that 3 gamma of thiamin corresponds to 1 I.U. of B_1 . This would mean that 12 units corresponds to 36 gamma. It checks with figures the Dutch workers get on the normal diet.

In a recent paper Goudsmit²⁸ makes the following comment on their results which is perhaps worth quoting:

Two subjects excreting normally 100 gamma or more of aneurin daily (aneurin is the continental name for thiamin) were dosed with 5 mg. aneurin during several days. During this time they always excreted the same amount of aneurin which indicates they were saturated with aneurin.

The mean excretion of 10 men who were living on a very good diet was 230 gamma in 24 hours; after uptake by mouth of 5 mg. aneurin they excreted on an average 560 gamma in 24 hours. Ten women living on the same diet but eating much less excreted on the average 120 gamma in 24 hours and after the uptake of 5 mg. aneurin by mouth 460 gamma in 24 hours.

From a certain amount of aneurin given by mouth a larger part is excreted when it is given in several small doses than when it is given in one large dose; so from a larger dose a lower percentage is excreted than from a smaller dose. The excretion is higher after intramuscular injection of larger doses of aneurin than after the uptake by mouth of the same doses; the difference increases with increasing doses. The difference is only evident in the first hour after the uptake of aneurin; no difference was observed in the next hours. Obviously, the high excretion during the first hour after the injection is caused by a temporary, abnormally high aneurin concentration in the blood.

Further, we may conclude from the experiments that the aneurin is not destroyed in the gut or to a very slight degree. Moreover these results show that a saturation test of patients and other subjects must be carried out by giving the aneurin by mouth and not parenterally. The application of both testing methods to some patients confirmed this view.

A distinct influence of pregnancy on the excretion of aneurin was observed; pregnant women excreted on the average, as well without as with an extra dose of aneurin, considerably less aneurin than non-pregnant women, who might be expected to be living on the same diet. With very few exceptions, the pregnant women were far from saturated with aneurin. Among 20 pregnant women, originating from the poorer classes of the Amsterdam population, there was a group showing several symptoms. The excretion of aneurin of the first group was higher than of the second group, and its food intake was more adequate.

In this country the thiochrome test has been studied by Cerecedo and Hennessey²⁹ using zeolite as the adsorbent and a special fluorimeter. They note that if the co-carboxylase is present and remains in the aqueous layer during isobutanol extraction of the thiochrome the method will give lower values than the bioassay. This can be corrected by kidney extracts which on incubation convert the co-carboxylase by hydrolysis. Or, one can use the method of Jansen.³⁰ Jolliffe has also devoted study to this test but as yet has not published his findings.

Prebluda and McCollum³¹ have coupled thiamin with para-aminoacetophenone to form a red dye, estimable colorimetrically. Melnick and Field³² report the use of this test with urines. In that connection Dr. Prebluda sent me the following letter which I insert in the matter of information on the status of this test.

"I have just received a letter from Dr. Melnick and thought that you would be interested in the following excerpt in connection with a rapid chemical test method for urine involving the use of our reagent:

"I am happy to be able to tell you of our success with the application of your reagent to the chemical determination of vitamin B_1 in biological materials. We can now assay accurately and very rapidly extracts of rice polish, wheat germ, liver and yeast. As you well know, vitamin B_1 exists in biological materials both as co-carboxylase and as free thiamin. No chemical method has been able to pick up the B_1 activity due to the

presence of co-carboxylase in the preparation. However, we have also developed a quantitative procedure for the conversion of the phosphorylated vitamin into free thiamin. By difference we can now estimate chemically the co-carboxylase content of various preparations. In addition, we have also been able to apply the method to urine analysis. We expect to devote the major portion of the coming year to problems of clinical interest dealing with vitamin B₁ metabolism.'"

Several others³³ have suggested color tests dependent upon coupling thiamin with color producing reagents but none of these tests have as yet been sufficiently extended to judge of their efficiency.

THE YEAST FERMENTATION TEST

Another urine test that promises value has been developed by Schultz, Atkin, Frey, Light and coworkers.³⁴ This test measures the B₁ content of biological materials by their effect on the alcoholic fermentation of yeast. On a normal diet the average daily urine output by this method was found to be 497 ± 47 gamma for adults and 333 ± 60 gamma for children. With added B₁ in 5 to 10 mg. doses they got variable results and found that much B₁ passed out in the feces (see Table IV). The importance of the fecal determination in determining saturation is obvious from these results.

TABLE IV

Ave. daily excretion on 2nd and 3rd days on normal diet plus 10 mg. B ₁
Subj. D: In urine 2,350 gamma; in feces 7,360 gamma
Subj. F: In urine 2,600 gamma; in feces 6,900 gamma
Ave. daily excretion on 2nd and 3rd days after reducing doses to 5 mg. B ₁
Subj. D: In urine 2,600 gamma; in feces 2,210 gamma

This method is not absolutely specific for B₁³⁵ but is simple to operate and offers a good method for following vitamin B₁ therapy.

We have been unable to find any results to date on the blood content

of B₁. Farmer has stressed the importance of having all the determinations, blood, feces, urine, to arrive at satisfactory indication of saturation. We do have a test for pyruvic acid content of blood (by Clift and Cook).³⁶ Platt and Lu showed³⁷ that in beriberi there is an increase in this acid in the blood due to failure of oxidation from lack of B₁. Johnson, *et al.*³⁸ have developed from the Clift and Cook procedure a quantitative method for determining blood pyruvate. The method consists in measuring the bisulphite binding substance in the blood. Johnson, *et al.* report that the normal content of blood averages 2.81 mg. pyruvic acid per 100 c.c., range 1.96 to 4.00 mg.% in 22 cases.

THE BRADYCARDIA TEST

This test has been used as developed by Drury, Harris, and Maudsley³⁹ for estimating food content of B₁ but has not been well adapted for clinical purposes.

MATHEMATICAL FORMULA OF COWGILL

Cowgill⁴⁰ has reduced the expression of B₁ needs of the human being to a mathematical formula which in revised form and on the basis that 1 I. U. of B₁ is 3 gamma, is as follows:

Int. Units B₁ required equals:

$$.00142 \times \text{wt. in kg.} \times \text{calorie intake}$$

Of this formula Cowgill says⁴¹:

"It should be emphasized that estimates of the human requirement for B₁ derived from my formula pertain to the minimum or beriberi-preventing level; the optimum intake is undoubtedly much greater."

CLINICAL TESTS FOR VITAMIN C DEFICIENCY

Blood and urine tests for vitamin C have attained far greater study than those for other vitamins, and Farmer⁴² has reviewed the subject in the *J.A.M.A.* recently. He has also kindly supplied data from his unpublished material to

illustrate some of the problems still to be solved. Incidentally, he cautions against the use of cyanide in blood treatment as affecting the titration for ascorbic acid content.

The most used test is that of Farmer and Abt.⁴³ By this method Farmer estimates from his collected results that a blood content of .5 mg.% or lower is indicative of active scurvy. That between .5 and .7 is the prescurvy range. Amounts over this with an average around 1 mg.% are probably indication of adequate supply.

Using this method Eddy, Mackie, and Bach¹³ tested the blood of 88 apparently normal individuals and individuals whose statement of diets indicated a good supply of C. Of these, however, the blood test showed 25 per cent to have a blood ascorbic acid content of less than .5 mg.%. Of the 63 individuals above .5 mg.%, the average blood figure was 1.06 mg.%, in agreement with most observers as indicating satisfactory saturation. The standard deviation in this series was .37 mg.%.

King⁴⁴ puts the normal at 1.2 mg.%. He considers, like Farmer, a value below .5 mg.% as indicative of C deficiency. Eekelen⁴⁵ and Heineman⁴⁶ have pointed out that the amount of C in urine and in blood depends upon at least two factors: the amount ingested and the amount stored in the body. They considered saturation indicated by a blood concentration of 1.13 mg.% or higher. Ingalls and Warren⁴⁷ call 1.15 mg.% normal. Bauman⁴⁸ found the fasting value of saturated individuals to range from .45–2.5 mg.%. Neuweiler⁴⁹ considers that a blood C of 1 mg.% indicates the body well saturated. He reports that of those showing .6–.75 mg.%, 50 per cent had hypovitaminosis C; of those showing .8–.95 mg.%, 27 per cent showed a slight hypovitaminosis C. Hypovitaminosis was severe in all cases showing .6 mg.% or less.

Chu and Sung⁵⁰ reporting on the blood values for normal and sick children put .85 mg.% as indicating saturation; .5–.8 mg.% as presaturation stage; and below .4 mg.% as indicating deficient C metabolism. All breast fed infants examined by them had higher than .5 mg.% and all infants artificially fed, plus little or no cabbage water, ranged from .168 to .342 mg.%. They found plasma C low in acute bacillary dysentery even with large intakes, in kala-azar and in tuberculosis.

Nielsen⁵¹ using the methylene blue test (similar to Emmerie's test) found in 100 supposedly normal individuals on the normal Danish diet examined between April and May a low of .3 mg.%, and the highest value obtained was in September and reached .4 mg.%. They found blood C low in gastric and duodenal ulcer cases.

In a discussion reported in *J.A.M.A.*, February 26, 1938, Spellberg and Keeton reported 1.18 mg.% or higher for normal patients. Rinehart, *et al.*⁵² showed a low blood C in rheumatoid arthritis.

Eddy, Mackie, and Bach¹³ applied the test to 27 cases of varying degrees of ulcerative colitis. Of these only 7 showed a blood C below .5 mg.%. Thirteen were below the presaturation value of .8 mg.%; 7 averaged 1.0 mg.%. These results emphasize the importance of actual tests rather than generalizations that a given disease is certainty of C deficiency.

Before discussing Dr. Farmer's results we may note the status of urinary tests for C elimination.

Harris and Ray⁵³ suggested testing excretion of vitamin C in urine with and without test dose as a criterion of body saturation with vitamin C. They noted that if the daily excretion fell below 25–30 mg. in 24 hours there was a probable C deficiency, but since the amount varies with the intake and other factors they suggested giving a

test dose. On such a procedure the saturated individual shows a sudden peak of excretion after the test dose; the unsaturated individual does not, as his tissues are assumed to take up the dose and the peak is lacking or lower. King⁴⁴ puts it that the net loss between intake and excretion for a person in state of saturation may be taken as an approximation to the quantity normally destroyed or "burned" in the body daily; that it falls usually between 25 and 50 mg. The following results from the Eddy, Mackie tests¹³ illustrate the effect of the test dose method:

Case Record

Test dose: 500 mg. ascorbic acid by mouth in 500 c.c. water at 9 A.M.

Excretion results:

Time: 11 A.M. 6.3 mg. in 65 c.c. urine
1 P.M. 18.1 mg. in 260 c.c. urine
3 P.M. 9.1 mg. in 135 c.c. urine
5 P.M. 10.2 mg. in 90 c.c. urine

Total 43.7 mg. in 6 hours; less than 10 per cent of the test dose.

There is a general tendency today to consider that unless 50 per cent or more of the test dose is promptly eliminated the individual is not in saturation.

Dr. Farmer⁵¹ however, suggests that his studies indicate that this reliance on per cent of C excreted in urine after test dose is not reliable unless one determines at the same time blood and fecal values. The following case record from his files illustrates his point.

Case record of Farmer (cancer case)

Patient on entering hospital had a blood C of .16 mg. % and a urinary elimination of 16.5 mg. in 345 c.c. urine. A routine intravenous injection of 1,000 mg. ascorbic acid daily was begun on October 11, in the hospital. The tests on this patient on subsequent days with 1,000 mg. injections daily are shown in Table V.

Two observations are noteworthy in this case: (1) The blood values as indication of saturation fail to correlate

TABLE V

Date	Blood C mg. %	Urinary C mg. in c.c. urine	Fecal C mg. gm.
Oct. 12	1.42	630.08	1,560
13	1.01	531.28	1,160
14	1.50	281.18	1,845
15	1.05	111.0	1,480
16	....	406.7	1,500
17	1.05	565.76	442
18	0.97	385.53	1,810
19	1.27	626.45	1,340
20	Surgical	operation on this day	
21	0.75	668.1	2,320
22	0.90	588	1,960
23		1,210 in 2,485 c.c. on Oct.	
24	1.32	23 & 24, or 605 per day	

with the per cent of test dose excreted in the urine. (2) The failure is not due to fecal elimination but some factor as yet undetermined.

Contrast these data:

Date	Amt. C Injected mg.	Blood C mg. %	Urine C mg.	Fecal C mg.
Oct. 14	1,000	1.50	281.18	0.94
Oct. 17	1,000	1.05	565.76	1.70
Total Urine and Fecal Excretion			Per cent Ingested that Was Excreted	
Oct. 14: 282.12			28	
Oct. 17: 567.46			57	

What is the true index of saturation? On October 17, the excretion in urine is greater than the blood value on October 14, but the blood value indicates better saturation on the 15th, than on the 16th.

Farmer notes another problem still unsolved. On a constant daily dose the blood level does not stay constant. The case given above illustrates this and also the following from Farmer's records:

Case record (Farmer):

Amt. test dose was 1,000 mg. ascorbic acid daily.

Date	Blood C mg. %	Urine C mg. in c.c. urine	Fecal C mg. gm. feces
9/9	0.24		
9/23	0.88	763.8 in 1,900	4.43 in 110
10/3	0.68		
10/10	0.92		
10/21	0.57		

Why these variations? Failure to recover in urine and feces does not prove utilization in tissues. There may be other factors involved and the 50

per cent elimination criterion as an index of saturation does not hold.

There are, in brief, still problems to solve as to the fate of C even if we have urine, fecal, and blood values.

THE INTRADERMAL TEST

Rotter,⁵⁵ basing his procedure on observations of the discoloration of phenol-indophenol dye when injected into the soles of guinea pig feet, came to the conclusion that the decolorization of the dye could be taken as an indication of tissue saturation with C when the dye was injected under the epithelium.

Portnoy and Wilkinson⁵⁶ confirmed his observations using the method with human subjects. They stated that 5 minutes or less for decolorization meant saturation; 10 minutes or more meant scurvy.

Poncher and Steubenrauch,⁵⁷ on the contrary, have been unable to find such a consistent relation between blood C values and intradermal test results. They report the test to lack sufficient specificity to make it a reliable index of saturation.

THE CAPILLARY RESISTANCE TEST

The principal exponent of this test in this country is Dalldorf⁵⁸ and in Sweden, Göthlin.⁵⁹ Others⁶⁰ have had variable experience with the test; some getting good correlation, others poor

checks. The test measures the fragility of the capillary and when that fragility is due to lack of C the test is specific for C deficiency. Unfortunately, there are other factors than C which affect the bleeding tendency and the test is therefore not specific.

Using the instrument designed by Dalldorf⁵⁸ Eddy, Mackie, and Bach¹³ got the type of comparisons with blood C values shown in Table VI.

In this series it will be noted that those with the greatest number of petechiae were in the low blood C group. It is also true however, that those with high blood C did show some petechiae and two, a surprisingly high fragility.

The test is useful in surveys for checking possible C deficiency but needs check against other tests to prove actual scurvy.

CLINICAL TESTS FOR VITAMIN D DEFICIENCY

Jeans and Stearns⁶¹ preface their discussion of vitamin D requirements with the following statement:

"The requirements of vitamin D may be defined as those amounts which, with ample intakes of calcium and phosphorus and a diet otherwise adequate, insure sufficient retention of calcium and phosphorus to permit (a) normal growth and mineralization of the skeleton and teeth of infants and children, (b) maintenance of the bony and dental structures during adult life, and (c) a sufficient supply for mother and infant during pregnancy and lactation."

On this basis they recommend 300 to 400 units per day for all groups except the pregnant and lactating mothers, and for them 800 units. They are uncertain as to normal adult needs but suggest 300 to 400 units.

Park⁶² under the heading of "How to gage the success of vitamin D therapy" makes the following pertinent comment:

"One can assume that preventive treatment is succeeding if the signs of rickets do not make their appearance in the roentgenogram of the radius and ulnar . . . if the level of the

TABLE VI

Group I		Group II	
Individuals with Blood C Below .5 mg. %		Individuals with Blood C Above .5 mg. %	
No. Petechiae *	Blood C mg. %	No. Petechiae *	Blood C mg. %
35	.001	4	.6
25	.04	17	1.72
30	.05	7	2.10
24	.07	14	2.8
16	.08 (3 cases)	5	2.97
26	.09	3	3.5
8	.14	7	3.85
5	.16	2	4.5

* Petechiae at 30 cm. mercury negative pressure

calcium of the serum remains above 9 mg. % and that of the phosphorus above 5 mg. %."

X-ray and blood Ca and P determinations are then the most commonly used clinical tests for adequacy of vitamin D in the prevention of rickets.

Park also suggests that the blood tests are valuable in detecting effect of overdose:

"The rule holds that the dose of D will not become toxic so long as the calcium and inorganic phosphorus levels in the blood are not affected. Apparently toxic action does not depend upon the level of vitamin D in the blood but upon its effect on the calcium and phosphorus metabolism."

Table VII gives an idea of the range of blood values in normal and rachitic types.

TABLE VII

Condition of Patient	Mg. % P	Mg. % Ca
1. Rachitis, no D	3	7
2. Normal with D	4-5	10
3. Hypervitaminosis D	8	15

Another method of using the blood figures on Ca and P for diagnosis is to multiply one by the other getting the Ca x P product. In general a product under 30 indicates rickets.

There is, however, increasing feeling that the blood P value and the X-ray tests do not detect satisfactorily the incidence of rickets or normal healing. For that reason other indices have been sought and at present the blood phosphatase content appears to be a means to better diagnosis.

THE BLOOD PHOSPHATASE TEST

Harris⁶³ says:

"... Another and more recent method depends on a measurement of the amount of the ferment, phosphatase, present in the blood. This is normally a constituent of the growing bone but when the bone is diseased as in rickets it leaks out into the blood in increased amounts. As the bone becomes healed, less phosphatase is found in the blood again."

Kay⁶⁴ has reviewed rather com-

pletely the rôle of phosphatase in the growth and disease of bone and has developed a test⁶⁵ for its presence and amount in the blood.

Some values reported by Kay⁶⁴ are given in Table VIII.

TABLE VIII

Disease	No. Cases	Phosphatase Highest	Content of Plasma Lowest	Average
None (normals)	33	.21	.08	.14
Rickets infantile	13	1.7	.42	1.03
Osteomyelitis	8	.41	.14	.27

More recent reviews of the subject have been made by Morris, Peden, and associates.⁶⁶ There are several methods of test devised which differ in method of expressing phosphatase values. Table IX shows results with 6 different tests from Morris and Peden's review.

TABLE IX

Normal Phosphatase Values
in Units

Method of Test	Adults		Children	
	Max.	Min.	Max.	Min.
Bodansky ⁶⁷	4.0	1.5	12.0	5.0
Cayla ⁶⁸	15.0	10.0	40.0	35.0
Jenner-Kay ⁶⁹	7.9	3.2	11.0	3.4
Kay ⁷⁰	0.21	0.10	0.34	0.17
King-Armstrong ⁷¹	13.1	3.7	20.0	15.0
Roberts ⁷²	5.5	3.0	....	....

Morris and Peden report a study of 506 children below 2 years of age. In 84.1 per cent of the cases with clinical or X-ray evidence of rickets the plasma phosphatase was increased above the normal limits. They believe that the phosphatase rise is an earlier manifestation of the rachitic state than is provided by the ordinarily applied clinical or roentgenological tests. They show that the addition of vitamin D produces a prompt fall in the phosphatase, roughly proportional to the size of the dose. The test therefore, becomes an index of the success of vitamin D therapy.

Barnes and Carpenter⁷³ have also reported a study of this test with a large number of infants. They say:

"Serum phosphatase test appears to offer an excellent measure of rachitic activity and

a means of determining the rate and progress of healing."

There is at present some difference of opinion whether the healing of rickets is complete when the phosphatase has returned to normal. Bodansky and Jaffe⁷⁴ take the affirmative view, while Barnes and Carpenter question it. The latter suggest that treatment should be continued for some time after the normal level has been reached to insure complete healing.

Clinical tests for the other vitamins are not yet developed to a point where one can make comment. Those listed in this report need further study. It is the purpose of the report to supply suggestion of matters that need study, for exactitude in vitamin prescription must await the perfection of such tests.

REFERENCES

1. Jeans and Zentmire. *J.A.M.A.*, 106:996, 1936.
2. Jeghers. *J.A.M.A.*, 109:756, 1937.
3. Ezickson and Feldman. *J.A.M.A.*, 109:1706, 1937.
4. Isaacs, Jung, Ivy. *J.A.M.A.*, 111:777, 1938.
5. Von Kries. *Graef Arch.*, 42:95, 1936.
6. Haig, Hecht, Patek. *Science*, 87:534, 1938.
7. Feldman. *Arch. Ophth.*, 15:1005, 1936; *ibid.*, 17:648, 1937.
8. Derby, et al. *Tr. Am. Ophth. Soc.*, 28:110, 1929.
9. Carr and Price. *Biochem. J.*, 20:497, 1926.
10. Holmes and Corbett. *Science*, 85:103, 1937.
11. Evelyn. *J. Biol. Chem.*, 115:63, 1936.
12. Menkin. *Deutsche med. Wchnschr.*, 58:1484, 1932.
13. Eddy, Mackie, Bach. Unpublished data.
14. Ferguson. *Analyst*, 60:680, 1925.
15. Clausen. *J.A.M.A.*, 101:1384, 1933.
16. Heyman. *J.A.M.A.*, 106:2050, 1936.
17. Connor. *J. Biol. Chem.*, 77:619, 1923.
18. Van den Bergh. *Biochem. Ztschr.*, 108:279, 1930.
19. Ralli, et al. *J. Lab. & Clin. Med.*, 20:1266, 1935; *J.A.M.A.*, 106:1975, 1936.
20. Kaufmann and Drigalski. *Klin. Wchnschr.*, 12:306, 1933.
21. Schneider and Weigant. *Klin. Wchnschr.*, 16:441, 1932; Boller, Brunner, Brodaty. *Wien. Arch. j. inn. Med.*, 31:1, 1937.
22. Peters. *Nature*, 135:107, 1935; Jansen. *Rev. trav. chim.*, 55:1046, 1936.
23. Pyke. *Biochem. J.*, 31:1958, 1937.
24. Cohen. *Rev. trav. chim.*, 54:133, 1935.
25. Westenbrink, Goudsmit, Jansen. *Nature*, 139:1108, 1937; *Rev. trav. chim.*, 56:803, 1937; *Acta brev. Neerland.*, 8, 21:119, 1938.
26. Helmer. *Proc. Soc. Exper. Biol. & Med.*, 32:1187, 1935.
27. Harris and Leong. *Lancet*, 1:886, 1936.
28. Goudsmit. *Acta brev. Neerland.*, 8:21, 1938.
29. Cerecedo and Hennessy. *Abstr. Milwaukee Proc. Am. Chem. Soc.*, 1938.
30. Jansen. *Acta brev. Neerland.*, 8:119, 1938.
31. Prebluda and McCollum. *Science*, 84:468, 1936.
32. Melnick and Field. *J. Biol. Chem.*, 123:83, 1938; *Proc. Soc. Exper. Biol. & Med.*, 38:723, 1938.
33. Naiman. *Science*, 85:290, 1936.
34. Schultz, et al. *J. Am. Chem. Soc.*, 59:948, 2457, 1937; *ibid.*, 60:490, 1938; and *Proc. Soc. Exper. Biol. & Med.*, 38:404, 1938.
35. Frey. *J. Am. Chem. Soc.*, 60:490, 1938.
36. Clift and Cook. *Biochem. J.*, 26:1788, 1932.
37. Platt and Lu. *Quart. J. Med.*, 5:355, 1936.
38. Johnson, et al. *Biochem. J.*, 29:2506, 1935.
39. Drury, et al. *Biochem. J.*, 24:1632, 1930.
40. Cowgill. *The Vitamin B Requirement of Man*. Yale Univ. Press, 1935.
41. Cowgill. *J.A.M.A.*, 111:1009, 1938.
42. Abt and Farmer. *J.A.M.A.*, 111:1555, 1938; and *Proc. Soc. Exper. Biol. & Med.*, 38:399, 1938.
43. Farmer and Abt. *Proc. Soc. Exper. Biol. & Med.*, 34:146, 1936.
44. King, C. G. *J.A.M.A.*, 111:1098, 1938.
45. Eekelen. *Biochem. J.*, 30:291, 1936.
46. Heineman. *Biochem. J.*, 30:2299, 1936.
47. Ingalls and Warren. *New England J. Med.*, 217:443, 1937.
48. Bauman. *Klin. Wchnschr.*, 16:1246, 1937.
49. Neuweiler. *Vitaminsforsch.*, 7:128, 1938.
50. Chu and Sung. *Chinese M. J. Peiping*, 52:791, 1937.
51. Nielsen. *Bibliot. f. Laeger*, Copenhagen, 130; 1, 1938.
52. Rinehart, et al. *Arch. Int. Med.*, 61:523, 1938.
53. Harris and Ray. *Lancet*, 1:71, 1935.
54. Farmer. Personal communication.
55. Rotter. *Nature*, 139:717, 1937.
56. Portnoy and Wilkinson. *Lancet*, 1:328, 1938.
57. Poncher and Steubenrauch. *J.A.M.A.*, 111:302, 1938.
58. Dalldorf. *J.A.M.A.*, 104:1701, 1935; *J. Exper. Med.*, 53:289, 1931.
59. Göthlin. *Skand. Arch. Physiol.*, 61:225, 1931.
60. Hess. *J.A.M.A.*, 98:1429, 1932; Hawley. *J. Nutrition*, 11:135, 1936.
61. Jeans and Stearns. *J.A.M.A.*, 111:703, 1938.
62. Park. *J.A.M.A.*, 111:1179, 1938.
63. Harris. *The Vitamins*. Macmillan, 1935.
64. Kay. *Physiol. Rev.*, 12:384, 1932.
65. Kay. *J. Biol. Chem.*, 89:325, 1930.
66. Morris, et al. *Quart. J. Med.*, 6:211, 1937; *Arch. Dis. Childhood*, 12:45, 1937.
67. Bodansky. *J. Biol. Chem.*, 101:93, 1933.
68. Cayla. *Bull. Soc. chim. biol.*, 17:1709, 1935.
69. Jenner-Kay. *Brit. J. Exper. Pathol.*, 13:22, 1932.
70. Kay. *Brit. J. Exper. Pathol.*, 10:253, 1929.
71. King-Armstrong. *Canada M. A. J.*, 31:14, 1934.
72. Roberts. *Brit. J. Exper. Pathol.*, 11:90, 1930.
73. Barnes and Carpenter. *J. Pediat.*, 10:596, 1937.
74. Bodansky and Jaffe. *Am. J. Dis. Child.*, 48:1268, 1934.

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Standard Methods of Vitamin D Bioassay of Milk

Food and Nutrition Section

THE method herein described incorporates the principles of the method outlined in the *U. S. Pharmacopocia*, Volume XI, page 478, for the vitamin D assay of cod liver oil. Terms herein used are defined in the U.S.P. XI. Subsequently, the Association of Official Agricultural Chemists¹ adopted tentative methods for the bioassay of vitamin D milks. Certain modifications of the U.S.P. method suggested by the A.O.A.C. when assaying vitamin D milks, are entirely optional with the assayer.

COLLECTION AND PRESERVATION OF THE SAMPLE

Wherever possible the sample of milk in the original bottle should be delivered to the assayer immediately after collection, or stored in a refrigerator until delivered. Shipments should be made in iced containers. Experience has demonstrated that dry ice is not suitable for shipping purposes unless very carefully packed. Even during the summer season the supercooling effect of dry ice in many instances causes the milk to freeze, resulting in the bottles cracking and a total loss of the sample. Shipping containers with icing pans (using ordinary ice) are preferable.

After acceptance by the assayer, the milk may be preserved in its original homogeneous state (a) by ordinary refrigeration (40° to 50° F.) for a period of not more than 1 week to 10

days, (b) for a period of not more than 30 days by the addition of two drops of 10 per cent formalin and ordinary refrigeration. Once a sample of milk becomes soured or curdled, it is unsuitable for assay purposes. Obviously, collection and preservation of evaporated or dried milk samples present no special problems; however, once they have been submitted to the assayer and opened, precautions with respect to preservation outlined above must be followed.

PRELIMINARY PERIOD

Rats suitable for test as standard rachitic rats may be prepared as follows: They must be born of and reared by rats kept on a stock ration low in antirachitic potency until they have attained an approximate weight between 45 and 60 grams at an age of 21 to 28 days.

A ration suitably low in antirachitic potency for this purpose has the following composition.

Yellow maize	71.0
Linseed oil meal	16.0
Crude casein	5.0
Alfalfa meal	2.0
Butter fat	5.0
Bone ash	0.5
Sodium chloride	0.5
Fed with fresh whole milk and water <i>ad lib.</i>	

If it is not convenient to use fresh milk, the diet may be modified as follows:

Yellow maize	57.0
Whole milk powder	25.0
Linseed oil meal	12.0
Crude casein	3.7
Alfalfa leaf meal	1.5
Iodized sodium chloride	0.4
Calcium carbonate	0.4
With water <i>ad lib.</i>	

All the solid constituents of the ration must be finely ground to prevent selection by the animals.

Throughout the preliminary period, each rat shall be raised under the immediate supervision of or according to directions specified by the assayer. Throughout the preliminary period, the rats, if maintained on either of the above dietary regimens, will be provided for normal development in all respects. The supply of vitamin D in the diets as listed is sufficient for maintenance needs and is limited to such a degree that rats weighing between 40 and 60 gm., at an age of 21–28 days, when placed on a suitable rachitogenic diet for 3 weeks will manifest evidence of severe rickets.

DEPLETION PERIOD

When the rats as produced above have reached the weight and age range above indicated, they are made standard rachitic rats by transference to and maintenance on a very finely ground rickets producing diet. Formulae for a suitable rachitogenic diet are given below.

*McCollum Diet 3143*²

1. Whole yellow maize ground	33.0
Whole wheat ground	33.0
Ground gluten	15.0
Gelatin	15.0
Calcium carbonate (CaCO_3)	3.0
Sodium chloride (NaCl)	1.0

*Steenbock Diet 2965*³

2. Whole yellow maize ground	76.0
Ground gluten	20.0
Calcium carbonate (CaCO_3)	3.0
Sodium chloride (NaCl)	1.0

It is advisable that each new lot of ration be used in a preliminary way

to determine whether it produces satisfactory rickets.

A rat shall be suitable for the depletion period when the age of the rat does not exceed 30 days, and if the body weight of the rat shall exceed 44 gm. and does not exceed 60 gm., and if the animal manifests no evidence of injury or disease or anatomical abnormality which might hinder growth and development. Throughout the depletion, each rat shall be provided with the rachitogenic diet and distilled water *ad lib.*, and during this period no other dietary supplement shall be available to the animal.

Throughout the depletion and subsequent assay period, the rats shall be maintained on wire screens in a room away from direct or reflected sunlight of sufficient intensity to influence rickets in the rat. A range of temperature between 72 and 80° F. is most suitable for the care of the animals during the depletion and subsequent test period as well.

ASSEMBLING RATS INTO GROUPS FOR ASSAY PERIOD

Rats which are suitable for the assay period shall be assembled into groups; for each milk assay there shall be one or more assay groups. In the assay of one vitamin D milk, there shall be provided at least one reference group, but one reference group may be used for the concurrent assay of one or more vitamin D milks. During the interval of assembling rats into groups, the total number of rats that shall have been assigned to make up any one group shall not exceed by more than 2 the number of rats that shall have been assigned to make up any other group. For a given sample, no less than 7 rats should be used, whereas 10 or more rats per given assay will reduce the error due to variation.

When the assembling of all groups shall have been completed, the total

number of rats in each group shall be the same. Not more than 3 rats from one litter shall be assigned to the assay group unless an equal number of rats from the same litter are assigned to the reference group.

In the reference group already mentioned, standard U.S.P. reference cod liver oil shall be used as a comparative standard for the vitamin D assay of milk. During the assay period the reference group shall receive separate from the rachitogenic diet ether extracted skim milk powder equal in weight to the solids not fat contained in the milk fed the assay group. This supplement shall be fed daily during those days of the assay period that the assay groups receive milk.

ASSAY PERIOD

A rat shall be suitable for the assay period, provided the depletion period shall have exceeded 18 days and shall not have exceeded 25 days, and provided a rat shall manifest evidence of rickets. The presence of rickets may be established by examination of a leg bone of one member of a litter by the "line test" described below or by X-ray examination of the animals selected for assay.

Rats suitable for the assay period are weighed and segregated in individual cages provided with screen bottoms, and shall be provided with the rachitogenic diet and distilled water *ad lib.* On any calendar day of the assay period, the assay and reference groups shall receive a rachitogenic diet compounded from the same lot of ingredients.

The assay period shall be 7 days. Throughout the first 6 days of the assay period, each rat in any one assay group shall be fed daily the calculated dose of vitamin D milk, and throughout the first 6 days of the assay period each rat in any one reference group shall be fed daily a dose of reference

oil, except that the following deviation from the daily feeding shall be permissible: that the daily dose of milk or reference oil may be doubled on the day preceding a one day holiday falling within the first 6 days of the assay period. At the termination of the assay period, each rat shall be killed by suitable means and one or more leg bones examined for healing of the rachitic metaphyses according to the line test described below.

The reference oil is diluted before feeding with an edible vegetable oil free from vitamins A and D. The diluted oil shall be stored in the dark at a temperature not exceeding 50° F., and the duration of this storage shall not exceed 30 days. Not more than 0.1 c.c. of the diluted reference oil shall be fed as a daily dose. Inasmuch as the dose of the reference oil required to give a standard narrow continuous line of healing may vary from laboratory to laboratory, depending upon conditions, the dose of reference oil to be fed shall be determined prior to the running of routine assays. By way of orientation, it may be said that a supplement falling between $\frac{1}{2}$ and $\frac{2}{3}$ U.S.P. unit of standard per day (U.S.P. reference oil) will be found to produce a narrow continuous line of calcium deposits in approximately three-fourths of the test animals. It is advisable to use the minimum amount of U.S.P. reference oil required to produce this degree of healing for comparison. The reference oil shall be diluted so that one-sixth of the dose determined to produce positive macroscopic evidence of calcification shall be administered each day for the first 6 days of the assay period.

PREPARATION OF STANDARD TO GIVE $\frac{1}{2}$ TO $\frac{2}{3}$ U.S.P. UNIT

Sample Calculation

Assuming that the reference oil contains 95 U.S.P. units per gm., then 1

unit is contained in 10.52 mg. If $\frac{1}{2}$ unit of oil is fed daily, 5.26 mg. of reference oil shall be diluted with 94.74 mg. of edible vegetable oil so that $\frac{1}{2}$ unit is contained in 0.1 gm. of the diluted oil. Inasmuch as the above dose is for one rat for one day, it is suggested that at least 50 or 100 gm. be prepared. This should suffice for any number of assays performed during a current 30 day period. If 100 gm. is the amount chosen, 5.26 gm. of reference oil shall be diluted with 94.74 gm. of the edible vegetable oil. For $\frac{2}{3}$ U.S.P. unit daily, 7.02 mg. of reference oil shall be diluted with 92.98 mg. of edible vegetable oil. From the amount of U.S.P. reference oil determined to be necessary to produce positive macroscopic evidence of calcification, the calculated amount of milk based on the unitage claimed is fed during the first 6 days in 6 equal doses. If $\frac{1}{2}$ unit per day for 6 days (3.0 U.S.P. or 31.56 mg.) is necessary to produce the type of calcification above described, then the dose of vitamin D milk which would be expected to produce a degree of calcification equal to or greater than the degree of calcification obtained in the reference group may be calculated.

For a vitamin D milk carrying 200 U.S.P. units per qt., this amounts to $\frac{3}{200}$ of 946 c.c. in 1 qt., or 14.14 c.c. total dose; if fed in graded doses during the first 6 days, $14.14 \div 6 = 2.35$ c.c. daily. A vitamin D milk carrying 400 U.S.P. units per qt. would require just one-half, or a total dose of 7.07 c.c. administered at a level of 1.18 c.c. for 6 days. If a higher increment of U.S.P. reference oil is required then the amount of milk to be fed, based on unitage claimed may be calculated. In the method just described, the milk shall be fed in small dishes separate and apart from the diet, and the reference oil may be fed in the same manner or by calibrated dropper or pipette.

The Association of Official Agricultural Chemists adopted a tentative method for the vitamin D assay of milk.⁴ Inasmuch as certain options or alternatives are permitted, it may be said that there are no objections to following the alternatives outlined in the A.O.A.C. if one chooses to do so.

Explanatory Note: Experimental trials and the experience of those now conducting routine assays of vitamin D milk show that departures from the U.S.P. XI method may be made in the manner in which the milk sample and the reference oil are fed, and in the length of the assay period.

If it is necessary to feed a relatively large quantity of milk, a single feeding may not be possible, and daily feedings for a period of days are necessary.

The extent of calcification at the end of a 7 day assay period is not as marked as at the end of a 10 day period. Hence it may be necessary to feed higher levels of milk and reference oil to obtain an adequate response at the end of a 7 day period.

As has been indicated, if use is made of any of the alternatives described, the dose of reference oil and milk will have to be calculated according to the chosen option. In any event, both the U.S.P. reference oil and the milk sample must be fed according to the same plan.

LINE TEST

The effect of the milk feeding and response to the U.S.P. reference oil is determined as follows: The line test shall be made on the proximal end of the tibiae or distal end of the radii or ulnae. The end of the desired bone is removed from the animal and cleaned of adhering tissue. A longitudinal median section shall be made through the end of the bone with a clean sharp blade to expose a plane surface through the junction of the epiphysis and diaphysis. In one assay, the same bone of all the animals must be used and sectioned through the same plane. Both sections of the bone shall be rinsed in distilled water and shall then be immersed in a 2 per cent aqueous solution of silver nitrate for 1 minute. The sections

shall then be rinsed in distilled water, and the sectioned surfaces of the bone shall be exposed in water to daylight or other source of actinic light until the calcified areas have developed a clearly defined stain without marked discoloration of the uncalcified area. Evidence of congestion in the rachitic metaphyses should be clearly distinguished from calcium salts stained with silver, as the principal criteria of healing are the development of the line at the zone of provisional calcification.

As an optional procedure, the bone after being removed and sectioned may be placed in 10 per cent formalin or 95 per cent alcohol for a period of 3 to 4 hours, after which it is rinsed in distilled water and stained with silver nitrate in a manner previously described. The use of this modification is purely optional; however, the bone specimens seem to stain more distinctly, the tissues harden and clear. The small time that the specimen is resident in the formalin is too short to cause any significant decalcification due to formic acid. If longer periods of storage are used 95 per cent alcohol is preferable. Other modification of the staining technic may be used providing they are equally satisfactory in showing calcified areas.

RECORDING OF DATA

Records shall be made immediately after staining of the extent and degree of calcification of the rachitic metaphyses of every section. Numerical values shall be assigned to the extent and degree of calcification of the rachitic metaphyses of the bones examined by the line test so that it will be possible to average the performance of the group. Assayers using the distal end of the radii and ulnae shall follow the method described by Dyer⁵ when evaluating numerically. If the tibia is used the method described by Bills⁶ should be followed. On the day be-

ginning the assay period and on the 7th day thereafter, a record shall be made of the body weight of each rat. A record shall be made of the quantity of the rachitogenic diet consumed per rat during the assay period.

VITAMIN D POTENCY OF THE MILK

In determining the vitamin D potency of the milk, the average performance of groups with respect to healing of rachitic metaphysis shall be considered, provided such average performance of a reference group shall be determined by data from rats which individually show an extent and degree of calcification equal to or greater than a condition described as positive macroscopic evidence of calcification, but less than an extent and degree of calcification described as complete healing. The data from a reference group shall be considered valid for establishing the vitamin D potency of the milk only when two-thirds or more, but not less than 7 rats, individually show macroscopic evidence of healing but not complete healing. The data from an assay group shall be considered valid for establishing that an assay milk conforms with labeled potency in terms of U.S.P. units only when two-thirds or more, but not less than 7 rats individually show macroscopic evidence of healing. The data from a rat shall be considered valid for establishing the average performance of a group only on the condition that the weight of the rat at the termination of the assay period shall equal or exceed the weight of the rat on the beginning day of the assay period, and that the rat has consumed 28 gm. or more of the rachitogenic diet during the assay period, and on the condition that the rat has consumed each prescribed dose of milk within 24 hours from the time it was fed.

The vitamin D potency of the milk is then calculated as follows:

CALCULATION OF POTENCY

The vitamin D potency of the milk may be calculated by using the following formula:

$$Y \times \frac{946}{X} = \text{U.S.P. units per qt.}$$

Y = U.S.P. units of vitamin D (total dose) necessary to produce a narrow line of calcification in the reference groups.

946 is the c.c. in 1 qt.

X is the c.c. of milk (total dose) necessary to produce in the assay group an equal or greater degree of calcification than that produced in the reference group.

REFERENCES

1. *J. Assoc. Off. Agri. Chem.*, 20, 1:70 (Feb.), 1937.
2. *J. Biol. Chem.*, 51, 41, 1922.
3. *J. Biol. Chem.*, 64, 263, 1925.
4. *J. Assoc. Off. Agri. Chem.*, 20, 1:78 (Feb.), 1937.
5. *Quart. J. Pharm. & Pharmacol.*, 4:503, 1931.
6. *J. Biol. Chem.*, 90:619, 1931.

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Ventilation and Atmospheric Pollution

Industrial Hygiene Section

Part I

Suggested Standards

IN brief review, the present Committee on Ventilation and Atmospheric Pollution was appointed in 1931 at the 60th Annual Meeting of the Association, Montreal, and finally reached a unanimous agreement on so-called "Working Standards" which were adopted by the Section on Industrial Hygiene at the 64th Annual Meeting, Milwaukee, 1935 (Year Book 1935-1936, page 74). With very slight changes these standards have been similarly adopted, as reported in the subsequent Year Books.

The committee resubmitted its report of the two previous years (Year Book 1936-1937, page 82 and 1937-1938, page 81) at the Kansas City Meeting, October 25, 1938. Only one slight change was made—for Item 14, "Ultra-violet or actinic ray effects on air or occupied space to be disregarded for the present," the last phrase was changed to read, "deferred for later consideration."

A movement to have these general standards adopted by the Governing Council of the Association after endorsement by the Committee on Research and Standards was held in abeyance, after due discussion at the Kansas City Meeting, to await further developments in the field, particularly in regard to more exact specifications.

It will be noted that, with the exception of Item 9, none of the 15 numbered items are specific in nature,

but are of general character and have been advisedly so drafted in view of the rather wide range of physiological adjustments and thresholds available to the normal individual, within which the committee felt it was not desirable to lay down closer specifications at this time.* In fact, Item 9 opened the way for controversy at the Governing Council meeting in Kansas City.

These standards are devised for the maintenance of comfort, health, and efficiency, assuming altitudes not exceeding 10,000 feet above sea level, and are to apply to *any and all* atmospheric or space environments intended for human occupancy by reasonably normal individuals.

Air and space intended for human occupancy shall possess the following qualities and conditions:

1. Cool rather than hot†—but avoiding a sense of chilliness.
2. Dry rather than damp.†
3. Still‡ or moving depending upon physical activity.†
4. Some diversity in temperature—time and space—rather than uniformity and monotony.†
5. Foot level as warm as head level.
6. Radiant, *i.e.*, local heat source as an item in heating, preferred.
7. Shockless temperature differentials between air-conditioned quarters and outer air, depending upon the length of stay indoors, *i.e.*, less differential for brief stays.
8. Essentially noiseless conditioning apparatus.
9. Minimum of 25 sq. ft. and 200 cu. ft. per person, otherwise air displacement equivalent

lent to 1,200 cu. ft. per hour per person.

10. Reduction of obnoxious dusts, bacteria, fumes, vapors, and gases to their sub-danger thresholds.

11. Satisfactory primary sense impression upon entering the room or space.

12. Maintenance of comfortable conditions during occupancy (room comfort impression).

13. Sufficient replacement of "foul air" with "fresh air" to meet odor-comfort requirements. Entrainment or filtering out of objectionable industrial odors.

14. Ultra-violet or actinic ray effects on air or occupied space to be deferred for later consideration.

15. Intelligent supervision.

The items of compressed or rarefied air are not considered here.

The Committee desires to call attention to *Report No. 76* of the Medical Research Council (Industrial Health Research Board), London, 1936, 109 pp., entitled, "The Warmth Factor in Comfort at Work. A

Physiological Study of Heating and Ventilation," by T. Bedford. (Note especially "Equivalent Conditions of Warmth"—discussion of Scale with Chart—pp. 50-56 of this *Report*.)

Comments and criticisms are invited and may be addressed to the chairman or any member of the committee.

* Agreements as to the majority of the exact specifications, of interest to engineers, and correlation with A.S.H.V.E. standards were summarized in the report of this Committee (*Year Book*, A.P.H.A., 1934-1935, pp. 108-112).

† Adapted from the British Health of Munition Workers' Committee, Memorandum No. 9, 1916.

‡ "Still" implies air motion under 25 ft. per minute.

EMERY R. HAYHURST, *Chairman*

PHILIP DRINKER

LEONARD GREENBURG

WILLIAM J. MCCONNELL

CAREY P. MCCORD

Part II

Standard Methods for the Examination of the Air

THE organization of this committee was described in the *Year Book* of 1935-1936, page 75, and the same membership of seven persons has obtained to the present time.

Some changes, however, have been made, from year to year, in the membership of the four sub-committees. These changes, chiefly additions of personnel, may be seen by referring to the annual *Year Books*.

The subtended reports for sub-committees I to IV were presented, discussed, and referred back, at the Kansas City Meeting, to the general

committee chairman for final format.

As heretofore, comments and suggestions are invited and may be taken up with any member of the committee or sub-committees as befits the subject matter.

EMERY R. HAYHURST, *Chairman*

HARRY B. MELLER (*Public Health Engineering Section*)

G. L. A. RUEHLE (*Laboratory Section*)

PHILIP DRINKER

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I. Report of Sub-Committee on Physical Procedures in Air Analysis*

Instruments and Methods for Recording Thermal Factors Affecting Human Comfort

1. Air Temperature: Mercury or alcohol thermometers, preferably with silvered bulbs, capable of recording temperature within 0.5° F.

2. Humidity: Sling psychrometer.

3. Air movement: Silvered kata thermometer,^{1, 2} heated thermometer anemometer,³ or hot-wire anemometer.⁴

4. Radiation: Radiation thermopile,^{5, 6} or globe thermometer.⁷

PHYSICAL AND PHYSIOLOGICAL BASES OF COMFORT

Comfort, in so far as heat or cold is concerned, is associated with a normal heat balance between heat production and heat loss, at normal body temperature, and with no sensation of effort on the part of the heat-regulating mechanism. Four of the basic factors affecting thermal comfort are: air temperature, radiation, air movement, and humidity. No one of these is independent of the others, but their effects are quite different under conditions of minimal or maximal perspiration.

In men at rest under ordinary air conditions, the metabolic rate remains approximately constant, but the proportion of heat loss by radiation, convection, and evaporation may vary greatly, depending upon the environmental conditions, and upon individual constitutional factors. In still air at 70° , radiation

and convection ordinarily account for about 75 per cent of the total heat loss, and evaporation for 25 per cent. Muscular exercise may alter these values.

Loss of heat by radiation depends on the temperature of the surrounding surfaces (walls, ceiling, floor, furniture, etc.) and is independent of air temperature. The latter directly affects heat loss by convection from the body surfaces, and, indirectly, evaporation loss. Air movement increases convection loss and may reduce the radiation loss by lowering the body-surface temperature.

Insensible perspiration is regulated according to requirements for heat balance and remains substantially unaffected by humidity. Cutaneous insensible loss is now known to take place by diffusion of water through the capillaries and involves no sweat-gland activity. Cutaneous loss is also influenced by changes in the water lost from the respiratory passages, as shown by Kuno⁸ and others. When the inspired air is dry, there appears to be a compensatory decrease of cutaneous perspiration, and when the air is moist, cutaneous perspiration increases, so as to maintain the total water loss approximately constant, according to requirements for heat regulation at any given temperature.

There is a critical temperature between 75° and 90° F. (depending on

* PUBLISHED NOV. 15, 1935.

individual constitutional factors, amount of clothing, acclimatization, etc.) at which sweating breaks out. Below this critical temperature (zone of insensible perspiration) evaporation loss remains approximately constant at about 25 per cent of the metabolic rate in persons at rest, regardless of the usual variations of temperature or humidity, and the body maintains thermal equilibrium by altering its surface temperature. When physical work is performed, the critical temperature may fall below 75° , and heat loss by evaporation may be considerably increased.

Above the critical temperature of 75° to 90° F., evaporation rapidly increases according to the output of sweat that is necessary for heat regulation. Winslow and his associates⁹ have recently demonstrated that in this region of "evaporative cooling," humidity, as well as temperature, affect the rate of sweat secretion through reflex changes of blood supply to the skin, a process that is accurately adjusted to maintain heat balance at a given temperature with low or high humidity, so long as moisture can evaporate at all.

It is clear from the foregoing that under ordinary conditions, during the heating season, the rate of heat loss from the body and the degree of comfort experienced depend largely upon radiation and convection. The principal environmental factors involved are air temperature, mean surface temperature of surrounding walls and objects (or mean radiant temperature), and air movement, and the best single index of their combined effects is body surface temperature.

In warm summer weather, sensations of comfort or discomfort depend largely on the rates of sweat secretion and evaporation, as these are indicative of the effort the body must make to maintain a normal heat balance. All four environmental factors are involved, and when the external temperature ap-

proaches that of the body's surface, humidity becomes the most important factor of all.

INSTRUMENTS FOR MEASURING INDIVIDUAL THERMAL FACTORS

1. *Temperature and Humidity*

The use of air thermometers and sling psychrometers is too well known to be described here; it is important, however, that the dry-bulb thermometer be silvered or suitably screened from radiation when measuring the true air temperature.

2. *Air Movement*

Instruments for measuring air movement in rooms generally depend in principle upon the rate of cooling of heated bodies, which varies approximately with the square root of velocity. The principal ones are the kata thermometer,^{1,2} the heated thermometer anemometer,³ and several types of "hot-wire" anemometers.⁴

The *dry kata thermometer* is the simplest of all low-speed anemometers now in use. It is well suited for measuring velocities between 30 and 400 f.p.m. in air currents that do not depart greatly from a horizontal direction. In ascending or descending currents that obtain in rooms ventilated by "upward," or "downward" supply systems, kata readings are not entirely reliable, as shown by Vernon,¹⁰ owing to natural convectional currents created by the heated kata bulb, which modify the true air movement. Errors due to convectional currents may be reduced somewhat, by turning the kata to a horizontal position after the spirit has left the expansion reservoir.

Standard katas are also subject to radiation errors if the temperature of surrounding walls and objects differs much from air temperature. By the use of silvered katas, this error may be reduced to within 4 per cent of the

velocity.² When measurements are made in temperatures near 90° F., or above, it is more convenient to use a high-temperature kata (blue kata) because the standard kata takes too long to cool over its range, 100–95° F.

The *heated thermometer anemometer*³ consists of an ordinary glass thermometer having a small bulb, with an electric heating coil wound around the bulb. Small dry cells furnish the heating current, and the voltage is regulated by a rheostat according to the velocity to be measured and sensitivity desired. Readings to be taken are the temperature of the heated and an unheated thermometer, and the voltage used. The velocity is read off a table, or chart, or computed from an equation. By varying the voltage, any velocity can be measured from 10 to 6,000 f.p.m.

Owing to its small bulb size and small temperature difference between air and bulb surface temperature (10 to 15° F. for measuring room air currents), the instrument is not appreciably affected by convectional currents of its own when held in a horizontal position. By painting the bulb with aluminum paint, or by covering it with tin foil, errors due to radiation from hot surfaces are reduced to 1.5 per cent of the velocity or less. The chief disadvantage is the necessity of a source of electricity.

The *hot-wire anemometer*,⁴ in its simplest form, consists of a short length of platinum wire which is heated electrically to a suitable temperature, usually between 200 and 300° F. when measuring room air currents. The hot wire forms one arm of a Wheatstone bridge, and the resistances of the other three arms are adjusted so that when the bridge is in balance, the resistance and, therefore, the temperature of the heated wire is at the desired value. Changes of air movement over the heated wire change the temperature of the wire and throw the bridge out of balance. The heating current must be

readjusted in order to restore the wire temperature to its former value, and the change in current is a measure of air movement.

As a laboratory instrument, the hot-wire anemometer gives excellent results, and by the use of three wires in a pyramidal grouping, it is possible to determine current direction as well. The chief disadvantage is the elaborate apparatus it requires, and this has hitherto limited its use.

3. Radiation

The ordinary thermometer is not sufficiently affected by radiation and little if any by air movement. A room may feel too cool at 75° or too warm at 65°, depending upon the temperature of surrounding surfaces or objects. Various types of radiometers are available, but the most suitable laboratory apparatus for measuring surface temperature, or amount of heat radiated, is a sensitive radiation thermopile used in conjunction with a suitable galvanometer or potentiometer. In the field, such instruments are not convenient because they are too delicate, as well as expensive, and a great number of readings are required to integrate radiation from all directions.

Bedford and Warner⁷ have found that readings of an unheated globe thermometer (consisting of a 6" blackened copper sphere with an air thermometer at the center) may be utilized for estimating mean radiant temperature or mean radiation intensity from its surroundings when the air temperature and air movement are determined simultaneously. The mean radiant temperature (t_w) may be computed approximately from a simple equation derived by these workers:

$$t_w = t_r + 0.169 \sqrt{V} (t_r - t_a)$$

and the mean radiation intensity from the surroundings is given by:

$$1.72 \times 10^{-9} T_w^4 \text{ B.t.u./sq.ft./hr.}$$

t_w = mean radiant temperature ° F.

$$T_w = 460 + t_w$$

t_g = globe temperature ° F.

t_a = air temperature ° F.

V = air velocity in f.p.m.

The mean radiant temperature, as estimated from the globe thermometer readings was found to be within $1\frac{1}{2}^\circ$ F. of radiation thermopile readings when the difference between air temperature and temperature of surroundings did not exceed 10° F.

Radiation in rooms heated by convection methods—Under ordinary living and working conditions in this country, the extent of radiation encountered is not great, except under unusual conditions. In an unpublished study, Yaglou found that in ordinary frame or masonry dwelling, office, and school buildings, heated to 69° – 75° F. by hot water, steam, or warm air, the mean radiant temperature was never more than 2.5° F. below or above air temperature. These readings were made at points 3 ft. above the floor in the center of rooms having one to three exposures. The outside temperature during the observations was between 6° and 35° F.

Observations made 6" from a large single-glass window on a cloudy day showed a maximum cooling effect equivalent to 4° F. approximately on a windy day when the outdoor temperature was 21° F. On another day, under approximately identical conditions, but with the sun shining through the glass, the maximum solar heating effect was equivalent to about 34° F. An ordinary glass thermometer under the same conditions showed a temperature only 9° above the true air temperature.

Vernon¹¹ reported a similar experience in British factories and homes. His globe thermometer readings were seldom more than 1.5° F. above or below air temperature, except in front of coal fires or furnaces which increased

the readings as much as 75° F. above air temperature.

COMPOSITE INDICES OF WARMTH AND COMFORT

Various physical instruments have been devised to combine into a single index two or more of the four thermal factors affecting warmth, and some success has been attained within the zone of insensible perspiration when the air movement was low. Among these devices are the Eupatheoscope,¹² the resultant thermometer,¹³ the thermointegrator,^{14, 15} the unheated,⁷ and heated¹⁶ globe thermometer, and others. Valuable as these instruments may be in integrating radiation from surrounding surfaces, their indications cannot be taken as a true index of warmth or comfort, since it is difficult or impossible for any physical instrument to anticipate human response to environmental conditions.

This committee is entirely in accord with conclusions recently reached by the Housing Commission of the League of Nations¹⁷ that in all research and experimental work the four constituent thermal factors (air temperature, humidity, air movement, and radiation) should be recorded separately, whether special integrating instruments are used or not. Such readings can generally be translated into the terms of any special instrument, or special scale, combining two or more environmental factors into a single index, such as "effective temperature,"¹⁸ "equivalent temperature,"¹⁹ or "operative temperature."²⁰ A brief description of physical instruments and thermal indices now in use will be found in a recent report of the Committee on Air Conditioning of the American Medical Association.²¹

DESIRABLE AIR CONDITIONS

The test for adequate air conditions should be the comfort of the individual, his psychological and physiological re-

actions to the conditions, and last, but not least, his inclination for work. No single comfort standard can be fixed to meet every purpose. The requirements differ according to the state of health, sex, age, clothing, activity, climate, season, and degree of acquired adaptation.

For persons at rest or in light sedentary occupations, an air temperature between 68° and 73° with a moderate or natural humidity, and with an air movement under 40 f.p.m. will prove satisfactory to the majority of healthy persons, during the heating season, provided that air and wall temperatures do not differ much. When this difference is great, some physical instrument must be used for estimating the mean radiant temperature in order to arrive at the proper air temperature for comfort.

Under conditions of sensible perspiration, as during warm summer weather, desirable air conditions are difficult to establish owing to the liability of chilling during sojourn to a cooled space, when the skin and clothes are wet from perspiration. For continuous stay in a cooled space, when little regard need be paid to prevailing outside temperature, the summer comfort zone of the A.S.H.V.E.²² will probably prove satisfactory to inhabitants of the northeastern section of the United States. For most practical purposes, however, this zone has more academic than practical significance, since sudden temperature changes are difficult to avoid under ordinary living and working conditions.

Current engineering practice in cooled buildings follows a sliding temperature scale, from 4° to 15° F. below the prevailing outside temperature, when the occupants remain in the cooled space 40 minutes or more.²² According to this schedule, when the prevailing outside temperature is around 80° F., the indoor temperature is adjusted to about 75° F., and when the outside

temperature is about 95° F., the indoor temperature is kept at 80° F. The relative humidity is kept between 50 per cent and 60 per cent in both instances.

Experience with this schedule has not been satisfactory and it proved quite difficult to find a substitute that would satisfy the majority of occupants. On entering a building cooled to 80° F. in 95 degree weather, all persons invariably experience a transient feeling of chilliness, which may be pleasant to some and unpleasant to others. After about an hour in the cooled space, the majority would be comfortable, a few would still shiver, and a few might feel a little too warm. On leaving the cooled space, all persons invariably experience more or less discomfort in readjusting themselves to heat; a few may become dizzy and depressed, while others who were cold may be contented at first, but they too may have difficulty in readapting themselves to heat later.

There is much to be learned about cooling in warm weather, and how the indoor conditions should be varied in relation to those out of doors. Some persons advocate dehydration of air with a temperature reduction only a few degrees below the prevailing outside temperature; others believe that the solution of the problem lies in radiant cooling methods, but there is not sufficient evidence to favor any particular method at present.

For men at work, suitable air conditions are almost impossible to establish, owing to the changing character of the requirements, particularly with respect to the type and rate of work, type of occupancy, duration of exposure, clothing, adaptation, etc. Each industrial process presents its own factors. The manufacturer should study and regulate conditions so as to bring about maximum comfort and work output.

Suitable air conditions for various kinds and rates of work have been

studied in the laboratory by Houghton, *et al.*,²³ Arnaoutow and Weller,²⁴ McConnell and Yaglou,²⁵ and in the field by Vernon,²⁶ Sayers, *et al.*,²⁷ and others.

REFERENCES

1. Hill, L., *et al.* Further Experimental Observations to Determine the Relations Between Kata Cooling Power and Atmospheric Conditions. *J. Indust. Hyg.*, 10:391 (Dec.), 1928.
2. Bedford, T., and Warner, C. G. The Influence of Radiant Heat and Air Movement on the Cooling of the Kata Thermometer. *J. Hyg.*, 33:331, 1933.
3. Yaglou, C. P. The Heated Thermometer Anemometer. *J. Indust. Hyg. & Toxicol.*, 20:497 (Oct.), 1938.
4. Ower, E. *The Measurement of Airflow*. Chapman & Hall, Ltd., London, 1927.
5. See standard works on physics.
6. Hardy, J. D. The Radiation of Heat from the Human Body. I. An Instrument for Measuring the radiation and Surface Temperature of Skin. *J. Clin. Investigation*, 13:593 (July), 1934.
7. Bedford, T., and Warner, C. G. The Globe Thermometer in Studies of Heating and Ventilation. *J. Hyg.*, 34:458, 1935.
8. Kuno, Y. *The Physiology of Human Perspiration*. J. & A. Churchill, Ltd., London, 1934.
9. Winslow, C.-E. A., *et al.* Physiological Reactions of the Human Body to Various Atmospheric Humidities. *Am. J. Physiol.*, 120:288 (Oct.), 1937.
10. Vernon, H. M. The Calibration of the Kata Thermometer. *Spec. Rep. Series 100*, Med. Res. Council, His Majesty's Stat. Office, London, 1926.
11. Vernon, H. M. The Radiation Experienced in Factories and Houses. *J. Indust. Hyg. & Toxicol.*, 19:498 (Nov.), 1937.
12. Dufton, A. F. The Equivalent Temperature of a Room and Its Measurement. Dept. of Science and Industrial Research, Building Research, *Techn. Paper 13*, London, 1932.
13. Missenard, A. Etude physiologique et technique de la ventilation. *Librairie de l'enseignement technique*. Paris, 1933.
14. Winslow, C.-E. A., and Greenburg, L. The Thermo-integrator. *Heat., Piping & Air Cond.*, 7:41, 1935.
15. Winslow, C.-E. A., *et al.* The Calibration of the Thermo-integrator. *Am. J. Hyg.*, 22:137 (July), 1935.
16. Yaglou, C. P. A Heated Globe Thermometer for Evaluating Environmental Conditions of Comfort and for Studying Radiation-convection Effects. *J. Indust. Hyg. & Toxicol.*, 17:185 (Sept.), 1935.
17. The Hygiene of Environmental Conditions in the Dwellings. Report of the Housing Commission. II. *Bull. Health Organ. League of Nations*, 6, 4:518 (Aug.), 1937.
18. Yaglou, C. P., and Miller, E. W. Effective Temperature with Clothing. *Tr. Am. Soc. Heat. & Vent. Engrs.*, 31:89, 1925.
19. Bedford, T. The Warmth Factor in Comfort at Work. *Indust. Fatigue Res. Board, Rep. 76*, England, 1936.
20. Gagge, A. P., *et al.* Thermal Interchanges Between the Human Body and Its Atmospheric Environment. *Am. J. Hyg.*, 26:84 (July), 1937.
21. McCord, C. P., and Witheridge, W. N. The Measurement of Air Conditions. *J.A.M.A.*, 111: 1647 (Oct. 29), 1938.
22. *Guide of the Am. Soc. Heating & Ventilating Engineers*, 1938.
23. Houghton, F. C., *et al.* Heat and Moisture Losses from Men at Work and Application to Air Conditioning Problems. *Tr. Am. Soc. Heat. & Vent. Engrs.*, 37:541, 1931.
24. Arnaoutow, G. D., and Weller, E. W. Procedure for Establishing Optimum Air Conditions for Light and Heavy Work. *J. Indust. Hyg.*, 14:4, 1932.
25. McConnell, W. J., and Yaglou, C. P. Work Tests Conducted in Atmospheres of High Temperatures and Various Humidities in Still and Moving Air. *Tr. Am. Soc. Heat. & Vent. Engrs.*, 31:101, 1925. Also, Work Tests Conducted in Atmospheres of Low Temperatures in Still and Moving Air. *Ibid.*, 32:239, 1926.
26. Vernon, H. M. *The Principles of Heating and Ventilation*. Edward Arnold & Company, London, 1934.
27. Sayers, R. R., and Davenport, S. J. Review of Literature on the Physiological Effects of Abnormal Temperatures and Humidities. *Pub. Health Rep.*, 42:933 (Apr. 8), 1927.

C. P. YAGLOU, *Chairman*
ALONZO P. KRATZ
C.-E. A. WINSLOW

II. Report of Sub-Committee on Chemical Procedures in Air Analysis

THIS sub-committee, which reported rather fully in preceding years, presented no report this year. In the meantime its very efficient Chairman, Warren A. Cook, found it necessary to resign because of his change of position and increasing separation from laboratory analytical procedures. At his recommendation and that of others, Dr. F. H. Goldman, another member of the committee, was appointed its new Chairman. Dr. Goldman is Chemist

of the Division of Industrial Hygiene, National Institute of Health, Washington, D. C., where his work has been long and favorably known. The remaining personnel of this sub-committee obtains as before.—E.R.H.

F. H. GOLDMAN, *Chairman*
ALLAN L. COLEMAN
HERVEY B. ELKINS
H. H. SCHRENK
CLAYTON A. SMUCKER

III. Report of Sub-Committee on Dust Procedures in Air Analysis

THIS sub-committee rested for the current year to give more time for comments and suggestions regarding its two previous annual reports—one on dust sampling and dust counting, and the other on chemical and petrographical analyses of industrial dust. The committee especially invites expression of

opinion along these or similar lines, to be considered for inclusion in subsequent reports. The committee personnel remains as for last year.

J. J. BLOOMFIELD, *Chairman*
THEODORE HATCH
CHARLES R. WILLIAMS

IV. Report of Sub-Committee on Bacteriological Procedures in Air Analysis to the Committee on Atmospheric Pollution

Measuring Sanitary Ventilation

IN the last report of our sub-committee (Year Book, 1937-38, p. 90), two questions involving analytic bacteriologic procedures were considered: (1) the application of a bacteriologic indicator of nasopharyngeal contamination in the semi-enclosed atmospheres of our habitations; and (2) methods for the estimation of the adequacy of ventilation of these semi-enclosed spaces for the removal of microorganisms discharged into these atmospheres by the occupants.

During the past year we have studied the following analyses made by the method of sanitary air analysis described in the first report of our sub-committee (Year Book, 1936-37, p. 97):

1. 2,000 air samples in the Laboratories for the Study of Air-borne Infection, University of Pennsylvania

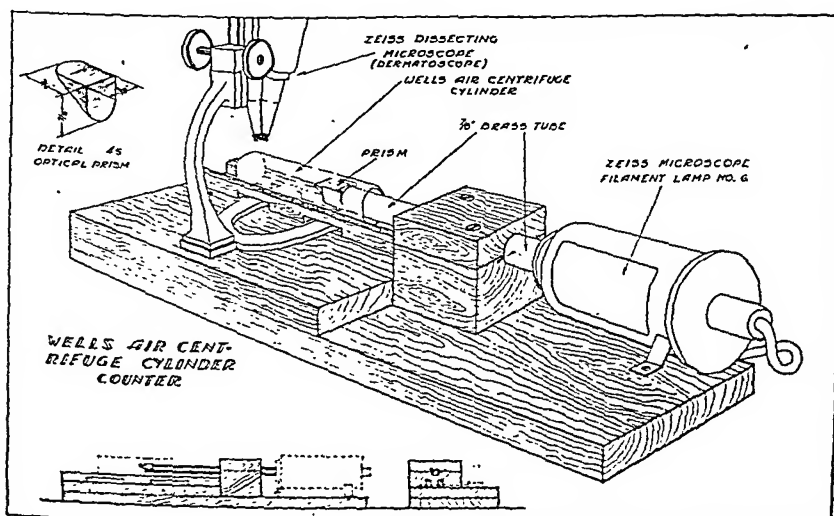
2. 2,500 air samples collected by the WPA Air Pollution Survey of the New York Department of Health, and analyzed at the DeLamar School of Public Health, College of Physicians and Surgeons, Columbia University

3. The results of many more analyses as yet unreported (called to our attention through personal communications)

Two simple routine procedures fulfil most of the present requirements in the measurement of sanitary ventilation:

1. Determination of the number of microorganisms present at any moment in the air of an occupied space as a result of the balance between the addition of microorganisms and their elimination by sedimentation or otherwise, this equilibrium indicating the hazard of infection to those breathing the atmosphere for a given time.

2. Determination of the rate of elimination of microorganisms by air displacement, or by disinfection by any physical, chemical or biological means.



The total count on blood agar tubes, incubated at 37° C. for 24 hrs. is found to be as useful in distinguishing general pollution of indoor air as was the body temperature agar count in sanitary water analysis. A counter has been devised for the rapid estimation of the number of colonies on tubes when too numerous to count with the naked eye. The use of this counter was described in the first report of the sub-committee, but a cut is provided for those interested.

Nasopharyngeal streptococci (*Streptococcus viridans*, predominantly *Streptococcus salivarius*) indicate potential respiratory infection in breathing air as do *Esch. coli* indicate potential intestinal infection of drinking water. Isolation of alpha streptococci from sample volumes of 5 cu. ft. of air may be quantitatively compared to the isolation of *Esch. coli* from 100 c.c. of drinking water, since these volumes represent roughly similar proportions of the daily per capita consumption.

The recognition, isolation, and identification of *Streptococcus viridans* colonies on blood-agar centrifuge tubes requires experience. The small amount of blood permissible in the tubes does not permit the formation of the characteristic green color on blood agar plates, and hemolysis due to crowding of other colonies obscures the reaction. The colonies themselves are small, round, above or below pin-head size, tending toward transparency. The peculiar color and shading of the iron rust halo surrounding each colony is, however, characteristic and almost unmistakable to an experienced eye, though, in the variety of blood alterations in the tubes, easily overlooked by less experienced observers. The effect becomes more pronounced after 24 hr. incubation.

The time of fishing the colonies from the tubes onto blood agar plates for confirmation is reached by a compromise

between the increasingly characteristic appearance of the colonies, and the danger of the more delicate colonies dying if fishing is too long delayed. A satisfactory plan has been to fish and ring colonies on the second day (24 hrs. incubation at 37° C., then keep the tubes another day or two and re-examine for development of further colonies, the second 24 hrs. being either at 37° C. or at room temperature).

In ordinary air samples, these streptococci are not so numerous but that all colonies can be fished onto blood agar plates. For convenience and economy, the blood plate may be divided into 8 sectors. The appearance of the streaks on blood agar plates is familiar to those who have studied nasopharyngeal flora. Formation of the typical green color of *Streptococcus viridans* provides sufficient identification for sanitary air analysis. Sugar tests have shown *Streptococcus salivarius* or *Streptococcus mitis* (i.e., lactose fermenting) to predominate, and sub-culturing hardly seems to repay the effort. When searching for pneumococci, inulin broth provides a rapid method for choosing those strains to which the bile solubility test is to be applied.

The air centrifuge provides a convenient method of sampling quantitatively the air for mouth streptococci in conjunction with Gordon's enrichment method of identification. In this manner the air pollution by respiratory organisms can be titrated against these mouth streptococci as an indicator in the same way that the intestinal pollution of drinking water can be titrated against *Esch. coli* as an indicator in the well known fermentation test. Comparative experience between the two methods is not yet sufficient to judge the accuracy of the enrichment method, but its simplicity recommends it for further investigation. We are now engaged in studies attempting

to determine the accuracy of, and also if possible to improve Gordon's enrichment medium in the light of later knowledge of the streptococcus group.

The second procedure has been tested under a great variety of practical conditions during the year. Since the facility of transfer of an infection from an infector to an infectee constitutes a single determination between two specific points in an atmosphere, it may be desirable to repeat the determination with the infector and infectee in reversed positions so as to compensate for the prevailing air currents, and to dis-

tribute the infection uniformly by means of an electric fan. In extensive atmospheres, several locations may be tested to obtain average conditions.

Various accessory measures may be needed for a thorough analysis of ventilating conditions.

This may include determinations of temperature, relative humidity and movement of the air, and, in the use of ultra-violet light, a suitable photometric measure of light intensity.

W. F. WELLS, *Chairman*

E. B. PHELPS

C.-E. A. WINSLOW

Coördinating Committee on Standard Methods*

Laboratory Section

ON this, the fifth anniversary of our committee, we might be pardoned if we took the time to review more than the work of the past year. However, it seems sufficient to mention but two outstanding accomplishments and rest our case on them. Our plans include developments in so many directions we can with confidence let the future take care of itself; especially is this true because we know the coming year will be conspicuous for the outward and visible signs of activities which it will reveal.

At first our functions were not clearly defined, and the reasons for our very existence were called into question. We have gradually found our place. Every member of the committee has been actively at work during these 5 years, and since work always begets work, we have found our functions expanding. Starting with 5 members, we have from time to time discovered the need for additional undertakings which have made advisable the appointment of additional members to the committee. There are now 9 members.

Methods for the bacteriological examination of shellfish constitute one of the most ancient functions of the Laboratory Section. Recollection of such matters always brings back the memory of Professor F. P. Gorham and the group of brilliant students inspired by his enthusiasm who always came to the meetings with him. If he could return now, his pride in their accomplish-

ments would be equal to the gratification he felt in their development while working with him. During the past 5 years Dr. Robert Breed has held as one of the functions of his committee the inheritance of Standard Methods for the Examination of Shellfish. During the past year it has seemed to us that the importance of the problems involved in the bacteriological phases of shellfish sanitation demanded a special committee. This has been made evident especially by the fine work of Dr. C. A. Perry. The result is that during the past few months such a group has been organized with James Gibbard as its Chairman. This committee will work toward the most efficient methods for the bacteriological examination of shellfish and shellfish waters, constantly revising such methods as knowledge advances. They will work in the heartiest coöperation with other committees of the Association interested in sanitation, in particular with the Shellfish Committee of the Public Health Engineering Section. The objectives of these two committees are identical; their functions are definitely different but wholly complementary.

For some years past the Laboratory Section has maintained a Committee on Biological Products. Therefore this group has not been affiliated with the Coördinating Committee. The belief has been growing that a better opportunity would be afforded for work toward the common purposes of the Laboratory Section if all chairmen of such committees might meet together

* Report of the Chairman.

occasionally to discuss problems which often are identical. At its last meeting the Coördinating Committee recommended to the Section Council that Dr. Elliott S. Robinson, Chairman of the Committee on Biological Products, be made a member of the Coördinating Committee. This recommendation was approved by the Section Council.

Of the two outstanding accomplishments mentioned at the beginning of this report, one is the development and establishment of a more efficient and economical method for the identification of the coliform organisms in water and sewage. This fundamental technical advance is to be credited to our Water Committee, of which Dr. John F. Norton is Chairman. I am certain, however, that neither Dr. Norton nor Mr. McCrady, who has been the Referee in personal charge of the investigation, would be willing to have omitted here recognition of the fine coöperation given us by Harry Jordan, of the American Water Works Association. He has the eternal gratitude of every one of us. Among the outstanding features of this Annual Meeting is the symposium arranged for discussion of slow lactose fermenters. The work to be reported there is destined to erect another milestone of progress in water bacteriology.

The investigations made by the Milk Committee, under the Chairmanship of Dr. Robert S. Breed, have given us more thorough and more accurate methods for the enumeration of bacteria in milk. It is the belief of the Coördinating Committee that these methods which involve the use of a special culture medium should be officially recognized and recommended. Not everyone is yet in entire agreement with this decision. Scientific progress must always be bringing about such differences of opinion. Always changes in the direction of progress will be opposed by a certain proportion of those who

have been applying the older methods. In deference to such persons the procedures commonly in use during the past several years are still permitted as alternate methods. The recommendation that we gradually go over to the more accurate and more searching technic does not imply that great things were not accomplished by the older methods. We know that their application brought about revolutionary improvement in milk quality. We can scarcely hope that the new methods will do more than lift the standard a little higher and cause the results of the examinations made in different laboratories to be more nearly uniform. At this meeting Dr. Breed is presenting a final revision of his volume on *Standard Methods for Milk Analysis*. The volume will be a reliable guide to all public health laboratory workers; it is our repository of the most recent technical and practical information on the subject.

Progress toward the compilation of a manual devoted to the Biology of the Laboratory Animal is reported by Colonel R. A. Kelser, Chairman of the committee which has that work in charge. This volume will be an exceedingly useful one to public health laboratory workers. In it they will find all the directions required for the care and selection of laboratory animals and complete information with regard to their usefulness.

The Committee on the Analysis of Frozen Desserts, of which Dr. Friend Lee Mickle is Chairman, has had a meeting recently at which reports were received indicating active work and fundamental progress.

The committee which has been most active of all, possibly, is that which concerns Diagnostic Procedures and Reagents, and of which Dr. William D. Stovall is Chairman. Several members of this committee have already completed their re-

ports, and other manuscripts are in process of final editing. It is hoped that by the end of the year the entire group will be ready for publication; soon thereafter we shall have available a volume of technical methods for the isolation and identification of the more important causative agents of communicable disease. Its value to laboratory workers can scarcely be overestimated.

It is always a temptation for the Chairman of the Coördinating Committee to tell all he knows about the work of the various committees and thus duplicate to a certain extent the reports of the committee chairmen themselves. This temptation is particularly strong in a discussion of the magnificent work done in the past year by Dr. Stovall's committee. It is only through the exercise of a strong conscious effort that I refrain from doing so.

In closing this report I must call attention again to the gratifying accomplishments of the Coördinating Committee. There has been no unnecessary lag at any point. The work at which we have aimed each year has been accomplished; we have even gone beyond such aims. We believe our Coördinating Committee has proved that as an administrative set-up it has thoroughly justified the ambition of its instigators and may be held up as an excellent example to other sections and organizations which have technical committee work to be done.

A. PARKER HITCHENS, *Chairman*

ROBERT S. BREED

JAMES GIBBARD

R. A. KELSER

FRIEND LEE MICKLE

JOHN F. NORTON

ELLIOTT S. ROBINSON

W. D. STOVALL

G. D. CUMMINGS, *Ex-Officio, Secretary*

Analyzing Frozen Desserts and Ingredients*

Laboratory Section

IN the progress report¹ of this committee to the Laboratory Section last year the *raison d'être* of the committee was sketched. Attention was called to the fact that at a Joint Session of the Laboratory and Food and Nutrition Sections, held during the Sixty-Fifth Annual Meeting in New Orleans, La., in 1936, favorable action was taken on a recommendation² that a joint committee be appointed from representatives of the two sections to prepare standard methods for analyzing frozen desserts, and that this committee be placed under the supervision of and made responsible to the Coördinating Committee on Standard Methods of the Laboratory Section. Further, in the report of last year it was recorded that a chairman had been appointed by the Section Council, with the advice of the Coördinating Committee; that a committee had been selected; that, at the two committee meetings held during 1937, refereeships had been apportioned among the members representing different portions of the United States and Canada; that much attention had been given to discussion of the functions of the committee; and that the scope and policy of the committee had been defined as follows:

The Committee for the Examination of Frozen Desserts will undertake to study and recommend methods—microbiological, chemical, and physical—which are to be used by

public health laboratories for the examination of frozen desserts other than plain ice cream and products used as ingredients which are already not within the scope of other committees. It will coöperate to the fullest extent possible with existing organizations such as the Association of Official Agricultural Chemists, the American Dairy Science Association, and the International Association of Milk Sanitarians, or other organizations which are active in this field. When other methods are considered necessary, we shall request the association which has been active in the respective field to recommend a desirable procedure. If no satisfactory method is available, this committee will use its best effort to recommend a method.

During 1937–1938 the refereeships in the committee have remained unchanged although additional associate referees have been appointed by some of the referees to assist them in the development of various phases of their problems. The full personnel of the committee will be published in the *Year Book*. A proposed additional refereeship to be filled in the near future is one on Methods of Testing for and Significance of the Presence of Coliform Organisms in Frozen Desserts.

It is urged³ again in this report that the members of this Section hear and study the report³ that the representatives on the committee from the Food and Nutrition Section will make to that Section at this Annual Meeting because that report will cover in greater detail certain of the activities of the committee. Attention is again called to the report of that committee presented at the last Annual Meeting to the Food and Nutrition Section.⁴

* Report of the Joint Standard Methods Committee on Analyzing Frozen Desserts of the Laboratory and Food and Nutrition Section (presented to the Laboratory Section).

Following the presentation of our report last year a meeting of the Joint Committee was held during the 1937 Annual Meeting. During 1938 a meeting of the committee was held in New York City at which a progress report was received from each member. The minutes of that meeting make it very evident that the committee is making real progress in developing methods for analyzing both frozen desserts and the ingredients they may on occasion contain. It has not seemed wise to rush forward so hastily that methods can be included as supplements to the Seventh Edition of *Standard Methods for the Examination of Dairy Products*, soon due to appear. Progress reports of some of the referees and associate referees are being mimeographed for distribution to as many interested persons as can be found who will review and criticise them.

Dr. F. W. Fabian, Referee for the Microbiological Examination of Ingredients, has reported that all but one of the associate referees for the microbiological examination of ingredients have placed manuscripts in his hands and he is engaged in the task of editing these reports to place them in the form of methods for circulation among any interested persons. Action by the committee has been taken so that no methods for analyzing frozen desserts or ingredients will be brought forth as official publications of the committee until approved by the Coördinating Committee on Standard Methods and by the Laboratory and Food and Nutrition Sections and until they can be released through the usual Association channels.

M. E. Parker, Referee on Sediment Testing of Frozen Desserts, in collaboration with his associate referees, has presented a report setting up in outline form the methods that have so far been studied. These cover proposed methods for sediment testing of frozen desserts,

as well as for dry milk, condensed milk, evaporated milk, and other ingredients. This referee has been asked to define for the committee, with the assistance of his associate referees, what shall constitute sediment in frozen desserts. Mr. Parker is endeavoring to work harmoniously with the referees for the sediment testing of milk and butter on the Committee for the Examination of Dairy and Food Products, and with the chairman of that committee, to the end that the procedures from this committee may be as uniform as possible with those proposed for determination of sediment in milk and in other dairy products.

Dr. J. H. Shrader, as Referee for Chemical Methods for Frozen Desserts, has been actively contacting the chairmen of committees of the Association of Official Agricultural Chemists to obtain coöperative action on several chemical methods for examining dairy products. He has reported that it seems likely that referees and associate referees may be appointed to act jointly for both associations. Dr. Shrader is asking persons working in that field to collaborate with him in the special technic involved in the application of chemical methods for colors and for saccharin in ice cream.

Dr. A. H. Robertson, as referee on that phase of our activity, has presented in practically finished form a manuscript on the Microbiological Examination of Frozen Desserts exclusive of plain vanilla ice cream, and is collaborating with Dr. Fabian, in the latter's capacity as Referee for Bacteriological Examination of Ice Cream on the Standard Methods Committee for the Examination of Dairy and Food Products, in an attempt to make the microbiological procedures for the examination of plain ice cream and those for other frozen desserts as uniform as possible.

James Gibbard, Referee for Methods

for the Examination of Gelatins and Stabilizers, in collaboration with his associate referees, has submitted proposed standard methods for the examination of those products. These methods are in so finished a form that doubtless they can soon be placed before interested persons within and outside of the Association for criticism and review.

It will be seen from this progress report that your committee is slowly emerging from the stage of closeted study into a phase of activity that may be participated in by any member of the two parent sections or by interested persons. Criticisms and comment are earnestly sought for and will be welcomed by the referees and associate referees. If furnished to the chairman of the committee, any suggestions will be placed before the committee for consideration by the appropriate referee. It is requested that the committee be continued, if such be the pleasure of the Section, for it is planned and expected that further progress can be made during the year. The hope is here expressed by your committee that in the not too distant future an edition of the *Standard Methods for the Examination of Dairy and Food Products* published by the Association

will contain supplements covering in a rather complete way the microbiological, the chemical and the physical examination of frozen desserts, ice cream mixes, and the ingredients used in the manufacture of the many frozen products that are now on the market. That accomplishment will demand the continued full coöperation of all interested persons in this and in other associations.

REFERENCES

1. Mickle, Friend Lee. Analyzing Frozen Desserts and Ingredients. Report of Joint Standard Methods Committee of the Laboratory and Food and Nutrition Section. *A.P.H.A. Year Book*, 1937-1938, pp. 98-100.
2. Palmer, William B. Report of the Committee on Milk and Dairy Products. *A.P.H.A. Year Book*, 1936-1937, pp. 53-62.
3. Fabian, F. W. Report of the Committee on Analyzing Frozen Desserts (Food and Nutrition Section). This issue, p. 34.
4. Shrader, J. H. Analyzing Frozen Desserts and Ingredients. Report of the Joint Standard Methods Committee of the Food and Nutrition and Laboratory Section (Food and Nutrition Section). *A.P.H.A. Year Book*, 1937-1938, pp. 49-81.

FRIEND LEE MICKLE,
Chairman,

JAMES GIBBARD
A. H. ROBERTSON

*Representatives from the Food and
Nutrition Section*

F. W. FABIAN, *Chairman*
J. H. SHRADER
M. E. PARKER

Examination of Dairy Products*

Laboratory Section

DURING the past year the Dairy Products Committee has continued its study on suggested formulae for standard agar. This work has been carried out under the supervision of C. A. Abele, *Referee*, with the co-operation of a half dozen or more public health laboratories. A preliminary report on his findings has been presented to the committee and is published in this Year Book.

The chairman of the committee, during the past year, attended the Western Branch A.P.H.A. Convention in Portland, Ore., in order to present in person the recent investigational work carried out under the supervision of the committee. This has resulted in unanimous support for recommendations regarding changes in the present standard procedure which are being made at this meeting.

The manuscript of the seventh edition of *Standard Methods for the Examination of Dairy Products* is now in final form and is being presented for approval at this meeting. The new edition should be available soon after

the beginning of 1939. A list of the most important changes has been drawn up for immediate publication in the *American Journal of Public Health*.† Laboratory directors are requested to coöperate in every way possible in bringing about acceptance of the recommendations and requirements made in this new manuscript. Each step forward has been taken after careful consideration and with the full realization of the fact that we have not yet completely accomplished the purpose for which the committee was originally appointed in 1905. It had been found by experience at that time that counts from duplicate samples of milk sent to different laboratories did not agree as well as was felt desirable. Even to this day, this remains a real problem in milk control work so that every effort made to bring about better uniformity in procedure is useful.

ROBERT S. BREED, *Chairman*

A. H. ROBERTSON

F. C. BLANCK

A. J. SLACK

MAC H. MCCRADY

R. V. STONE

C. A. ABELE

* Report of the Standard Methods Committee.

† See *A.J.P.H.*, Dec., 1938, p. 1447.

Comparative Tests of Agar Media for Standard Milk Work*

Laboratory Section

YOUR referee is at this time presenting only a preliminary report of a study of the results obtained by plating samples of milk on several media under test, and at incubation temperatures of 37°C. and 32°C. Numbers of such studies have been conducted, and the results reported in the literature. However, in order to have a basis for official action the committee was of necessity required to conduct its own study.

Plate counts of milk being subject to so many factors which materially affect the results, the initial objective of your referee was the establishment, in all laboratories participating in the study, of a procedure in full conformity with that prescribed in Standard Methods—as published in the Sixth Edition, and in manuscript for the Seventh Edition. Accordingly, with the aid of Drs. Robert S. Breed and A. H. Robertson, of the committee, an Outline of Procedure was prepared.

In the spring of 1938 an invitation to participate in the committee's study, in the manner set forth in this Outline of Procedure, was sent to the directors of 41 public health and university laboratories, and a number of laboratories were subsequently approached by Dr. Breed, making a total of 48 invitations. Ten directors agreed to

participate. To these report forms were forwarded, and the Difco Laboratories and the Baltimore Biological Laboratory furnished prepared media sufficient for the number of sample examinations promised.

Prior to October 18, 1938, reports on 244 series of sample results had been received from 6 laboratories, and have been considered in the compilation of this preliminary report. Names of the laboratories, their directors, and the participating assistants, are given later in this report.

It early became evident that results given in every report must be carefully checked, and that some definite rules must be adopted in arriving at the counts to be reported and used in this study. Because of the fact that the Outline of Procedure to be followed prescribed duplicate sets of plates of each of two dilutions, Standard Methods is not quite clear as to the procedure to be used in arriving at the count to be reported when the results of the duplicate platings do not correspond exactly. It was also quite clear that extreme caution must be exercised in accepting and including in the data counts which had been derived from overgrown or under-developed plates, and from sets of duplicate plates the results of which did not correspond with a reasonable degree of closeness. Consequently, your referee arbitrarily adopted the following rules of procedure:

* Preliminary Report of the Referee to the Committee on Standard Methods for the Examination of Dairy Products.

1. Counts based only upon obviously overgrown plates are not to be considered.

2. Counts derived only from plates having less than 20 colonies are not to be considered.

3. The ratio of the calculated counts from the two plates of any set (1:100 and 1:1,000, or 1:1,000 and 1:10,000) of the duplicate platings must be less than 1:2.5, for the final count to be considered.

4. The variation in the calculated counts from the two duplicate sets of plates must be within the limit of a deviation of 25 per cent from the mean, for the final count to be considered.

The application of these rules resulted in the discarding of a considerable number of the counts reported. Your referee must also accept the responsibility for having altered numbers of the counts reported, both to correct arithmetical errors and to make them conform to methods of reporting prescribed in Standard Methods. All counts on which this study is based have been calculated only to two significant digits.

Your referee has conceived the object of this study to be a search for trends in plate counts, when samples of milk are plated and incubated under closely controlled conditions, as prescribed in Standard Methods. Therefore, every report has been checked for media pH, media pouring temperatures, and incubation temperatures. Conformity to the criteria fixed for these conditions has been very gratifying.

This study pertains to trends in plate counts obtained by the use of 3 media—Standard Nutrient Agar, Tryptone-Glucose-Extract-Milk Agar, and the agar prescribed by the American Association of Medical Milk Commissions—and incubation of the plates, as before stated, at both 37°C. and at 32°C. Each report, therefore, presents 6 distinct, but related, results. Since numerical tabulations do not necessarily produce either a clear or an accurate impression of the relationships they are intended to present, except by laborious analysis, your referee

has dispensed with tables in this preliminary report, and is presenting to the committee for consideration now the results of the platings on each medium, and of incubation at each temperature, in comparison with the results from the same samples when plated on Standard Nutrient Agar, and incubated at 37°C., in graphic form. (Note: These graphs or charts will appear in a formal final report to be published at some subsequent date.) Since this is a preliminary report, and because these charts have been too recently completed to have allowed time for analysis and comparison with published results of similar studies, no attempt to make comparisons or to draw parallels is now made.

Advantage is taken of this occasion, however, to point out that the striking variations in counts obtained under the several conditions under study are somewhat disconcerting to one interested particularly in the plate count as a criterion or factor in the grading of milk supplies from a public health standpoint.

The average lay milk control official probably ascribes to plate counts of milk on Standard Nutrient Agar, at 37°C., a greater degree of uniformity, stability, or fixity than the facts justify. In the charts presented the accuracy and fixity of counts on Standard Nutrient Agar, at 37°C., is taken for granted as a point of departure for determining the deviation of counts determined by means of other media, and a lower incubation temperature. Were another measure of bacterial content taken as a point of departure—such as the microscopic count or the methylene blue reduction time—these same counts on Standard Agar would probably also appear to be variable and misleading. But, custom and usage has made the plate count on Standard Agar, at 37°C., the basis for such bacterial count limits for milk supplies as have

AGAR MEDIA

been fixed, and these counts must, therefore, be used as the basis for comparisons made in this study. It is rather disconcerting, therefore, to note that samples yielding counts of an identical magnitude on Standard Agar, at 37°C., may yield counts of 3, 4, or even more magnitudes under several of the other cultural conditions studied. This denotes complete unpredictability in the relationships of counts made with a new medium and at a lower incubation temperature (particularly the latter), and presages great difficulty in fixing bacterial count standards and limits for milk, ice cream, and other dairy products.

However, this report presents preliminary data only. Your referee does not now express an opinion about the desirability of prescribing changes in medium and incubation temperature in Standard Methods, leaving that to be determined, after discussion, by the members of the committee.

The laboratories which have thus far participated in this study are:

Division of Bacteriology, New York State Experiment Station (Cornell University), Geneva, N. Y. Dr. G. J. Hucker, Chief in Research, William Walters, Bacteriologist.
City Health Department, St. Louis, Mo. Dr. Joseph C. Willett, Chief of Laboratories, J. Lazarov, Bacteriologist.

Bureau of Health, Portland, Ore. Dr. Leigh H. Churchill, City Bacteriologist, Wilfrid C. Kennell, City Chemist.
Bacteriological and Serological Laboratories, Department of Health, Louisville, Ky. Dr. James A. Kennedy, Director, W. L. Williams, Sanitary Bacteriologist.

Ontario Department of Health Branch Laboratory, Ottawa, Ont. Dr. Frank S. Letts, Director, J. Baron, Asst. Bacteriologist.
New York State Department of Health, Bureau of Milk Sanitation, Mobile Laboratory. W. D. Tiedeman, Chief, N. J. Hohl, Bacteriologist.

(NOTE. After this preliminary report had been presented, a number of reports were received from the Bureau of Laboratories, Detroit Department of Health, Detroit, Mich. Dr. Joseph A. Kasper, Director, Gail A. Smith, Laboratory Medical Aid.)

The committee is deeply indebted to all of those named for the time, use of equipment, and directional effort devoted to these multiple examinations of milk samples, without which this study would have been impossible. And it is also indebted to Dr. H. G. Dunham, of the Difco Laboratories, Detroit, and to R. J. Carski, of the Baltimore Biological Laboratory, Baltimore, for supplying the participating laboratories with Standard and T-G-E-M Agars, and with A.A.M.M.C. Agar, respectively, without charge.

C. A. ABELE, *Referee.*

Industrial Sanitation*

Public Health Engineering Section

IN addition to work done by engineers specializing in industrial hygiene, there remains a broad field of work for public health engineers in industrial sanitation. Both the specialized work and the work in industrial sanitation done by the general engineer continue to grow in scope and amount.

The latter is handicapped by a grave difficulty of collecting and keeping up to date files of the voluminous and necessary working data which are amassing on the subject. The engineer promoting and applying practical methods to the field of industrial sanitation encounters one certain difficulty in a degree worse than in most specialties. His source material must be culled from many specialties, he must follow the contributions of the physician, the chemist, the sanitary engineer, the safety engineer, the heating and ventilating engineer, the electrical engineer or physicist, and the bacteriologist in their respective groups of publications.

The Committee on Industrial Sanitation has undertaken to study these sources of material with a view to reporting progress on what means should prove practicable for expediting the assembly of the most valuable part of such working material for the public health engineer. The motive underlying this activity is advancement of the application of industrial sanitation.

The committee has also given consideration to the part the engineer

should play in the development and administration of programs. For three consecutive years verbal reports have been made by the chairman at annual meetings to interest members of the Public Health Engineering Section in extending the work of the engineer in this field.

Specific recommendations on desirable policy have not been formulated for this report because the committee has not yet reached unanimity of opinion on the proper scope and direction of industrial sanitation or the best relation of the public health engineer to it.

However, a joint session on industrial sanitation between the Public Health Engineering and the Industrial Hygiene Sections has been secured for the 1939 annual meeting at which time opportunity should be available to clarify many problems which have arisen because of the overlapping of jurisdictions or interests of the two sections in many phases of industrial sanitation.

The committee sponsored a questionnaire to ascertain the desires of some 75 non-medical industrial hygiene technologists in the matter of adequacy of existing organizations for meeting their needs when it was learned that a new national organization of these workers was being formed. The situation was placed before the Executive Board of this Association in Kansas City from whom assurance was received that every reasonable effort would be made

* *Proceedings, P. H. E. S.*

within the flexibility of the Association's framework to retain the interest and affiliation of this group. The problem still confronts the two sections mentioned inasmuch as the leadership in the technology of industrial sanitation now enjoyed by this Association

is threatened if this group cannot be induced to forego complete deflection.

CHARLES LUNDY POOL, *Chairman*

WILLIAM H. CARY, JR.

W. SCOTT JOHNSON

WARREN J. SCOTT

ALEXANDER ZIMMERMAN

Qualifications for and Training of Milk Sanitarians*

Public Health Engineering Section

THERE is a definite tendency on the part of health administrators to fix by statute, regulation, or otherwise, qualifications for milk sanitarians or inspectors. This year your committee has undertaken a study of these qualifications in the various states as well as the educational facilities available throughout the country for both the general and special training of milk sanitarians.

So-called "dairy and milk inspectors" who came and went with every change in local administration regardless of education, fitness, or experience, are almost a thing of the past. Today, however, there are many milk inspectors or sanitarians, particularly in local municipal employ, who have had little if any opportunity to study the technical side of milk sanitation.

We recognize that the protection of public health through sanitation of our milk supplies requires technical knowledge in the light of which some health department efforts of former days, based only upon the principles of good housekeeping, look foolish. The spectacle of uneducated and untrained men literally "straining at gnats and swallowing camels" in the name of milk sanitation is evidence enough of the need for fixing qualifications and providing means for the men already in and

entering this field to meet those qualifications.

As an indication of what health officials expect of milk inspectors we quote the following from a paper¹ by Dr. John L. Rice, Commissioner of Health of New York City:

The inspector has to be enough of an architect to give advice on the construction and layout of a milk plant, and enough of a mechanical engineer to pass judgment on the sanitary construction and proper operation of milk equipment. He should be enough of an expert on water supply and sewage disposal, at least to have sufficient ability to detect irregularities, and understand the operation and sanitary precautions for the relatively simple water or sewage plants. He must to some extent be a bacteriologist and chemist in order to make microscopic counts and simple field tests and interpret the results, and to understand laboratory reports of analyses. He should be a psychologist and educator of sufficient ability to sell himself and his milk control program to producers and dealers of milk. He must have poise, alertness, and at times a knowledge of court procedure in the event that court action becomes necessary.

For the sake of brevity the term "milk sanitarian" as used here includes both the positions bearing the title of milk sanitarian and milk inspector.

Our information has been obtained by correspondence with state departments of agriculture, state health departments, and universities. In practically all states either civil service requirements or department regulations fix qualifications for *state* milk sanitarians. While it may be desirable

* Report of the Joint Committee on Milk Supply of the Conference of State Sanitary Engineers and the Public Health Engineering Section, A.P.H.A.

both to set and raise standards and provide special courses for state personnel, the major problem at present has to do with local or municipal employees.

All 48 states have reported. Six states, namely, California, New Jersey, New Mexico, New York, Washington, and West Virginia, have either statutes or regulations fixing qualifications for municipal milk sanitarians. These differ widely.

California law requires that city or county inspection services be "approved" by the State Director of Agriculture, who in turn fixes qualifications for inspectors by formal regulations.

Under the laws of New Jersey, the State Department of Health is authorized to and does give qualifying examinations to local health officers and sanitary inspectors, including milk inspectors. The law further provides that licenses, in three classes, be issued to those approved by the State Department of Health as a result of these examinations.

In New Mexico, regulations of the State Board of Public Welfare require that county and district sanitarians be certified as sanitarians by the State Bureau of Public Health, and further include qualifications as to education and experience and require a written examination by the Bureau of Public Health.

The public health law in New York State authorizes the Public Health Council to prescribe by regulation the qualifications of dairy and milk inspectors paid from public funds. Under this authorization, regulations have been incorporated in the State Sanitary Code fixing qualifications as to education and experience for milk inspectors in three grades and specifying the grade of inspector required to be in charge of milk sanitation in municipalities in various population groups.

The statute in the State of Wash-

ington requires that milk inspectors "shall be graduates of a recognized dairy school or shall have completed a course in dairying in a college where such instruction is given."

In West Virginia, regulations of the State Public Health Council set certain age and educational requirements, and in addition require special training, including 6 weeks at the West Virginia Public Health Training Center or its equivalent.

The methods used in California, New Jersey, New Mexico, New York, and West Virginia are flexible enough so that standards can be raised at will by the authorities. The Washington statute so fixes the requirements that another act of the legislature is necessary to change them.

Some milk sanitarians now in service are inclined to view with fear the fixing of qualifications. When new qualifications are established consideration is generally given and rightfully so to the men in service who are willing to improve themselves by taking special training. Qualifications should serve to curb the tendency to change milk sanitarians with every change in administration, giving the municipality better service and giving the sanitarians a greater sense of security. Qualifications covering experience should not be placed so high that there is no place in the system for men with adequate training to get started.

Recognizing the demand for trained milk sanitarians, some colleges offering public health work are strengthening general undergraduate courses having a bearing on milk sanitation. Others are offering, either on their own initiative or in coöperation with state health departments and conferences of mayors, special short courses for either postgraduates or for practical milk sanitarians with limited education. These short courses vary considerably in duration, frequency, and composi-

tion. Three day courses with programs comparable to those offered at the annual meetings of some of the larger associations or with milk inspectors have been offered at the University of Missouri, Ohio State University, Texas A. & M. College, and Texas Technological College.

Another opportunity for the milk sanitarians to obtain special training has been offered by the U. S. Public Health Service in the form of 1 week seminars.

We have not attempted to circularize state associations of dairy and milk inspectors. It is known, however, that associations in California, Connecticut, Massachusetts, Michigan, New York, Oklahoma, Pennsylvania, Texas, and West Virginia in addition to the International Association of Milk Sanitarians carry on active meetings with programs designed to keep members informed on current developments in the field of milk sanitation.

Special short courses of instruction in milk sanitation have been offered by a few colleges. These are open to milk sanitarians as *in* service training. Cornell University in New York State offered a 15 day course for the first time this year and the Pennsylvania State College offers a course of similar length yearly.

There is a tendency on the part of some to discount these special courses and to insist that broad general education is essential. For new men entering the field, there is no doubt that broad general training in public health, particularly in public health engineering, constitutes an important background. For the men already employed, general education through regular courses is impractical, and some form of special education is important if progress is expected. Otherwise we must sit back and wait for relatively young untrained men with tenure now in service to grow old and die before we can expect to secure

necessary improvements. Such courses also offer an opportunity to men with broad educations but little experience to get practical detailed information in a short time. It appears that there is need for these short courses as well as for broad training in regular undergraduate college courses.

Eleven colleges including Yale, Connecticut State College, Massachusetts State College, Massachusetts Institute of Technology, University of Michigan, Michigan State College, University of Minnesota, Cornell University, University of North Carolina, Texas Technological College, and West Virginia University are reported as offering courses which include material of special public health value to milk sanitarians in varying degrees. Courses in dairy management, animal husbandry, milk products judging and dairy manufacturing, such as are offered in most agricultural colleges, have not been considered because of the general lack of public health emphasis in such courses.

SUMMARY

The need for better trained men is recognized in the field of milk sanitation as in many other fields. Six of the 48 states prescribe qualifications for local milk inspectors by statute or official regulation. Eleven colleges in 8 states are offering fundamental courses in regular undergraduate work that are of special value in training milk sanitarians from the standpoint of public health. Two colleges in different states are offering special 15 day courses of instruction for milk sanitarians. The U. S. Public Health Service offers 1 week seminars. State departments of health, colleges, conferences of mayors, and milk inspectors' associations in 10 states and the International Association of Milk Sanitarians have technical meetings or conferences annually which are usually of 3 days' duration. Increasing opportunities for both under-

graduate and *in* service training in milk sanitation should make it possible for milk sanitarians to meet higher educational requirements.

The committee does *not* propose that this association adopt qualifications for milk sanitarians. Although it is too early for the committee to recommend definite qualifications, for consideration by state officials, the goal is suggested that all new appointees should at least be graduates in sanitary engineering, dairying, veterinary medicine, or some other field allied to milk sanitation, and

that either as graduates or undergraduates they should have attended the equivalent of one short course or seminar in the more specialized public health aspects of milk control.

REFERENCE

1. Rice, John L., M.D. *Administration and Procedure in the Enforcement of Milk Regulations, 12th An. Rep. N.Y.S. Assoc. Dairy & Milk Insp.*

W. VON D. TIEDEMAN, *Chairman*

L. C. FRANK

R. E. IRWIN

E. S. TISDALE

H. A. WHITTAKER

Engineering Service in City Departments of Health*

Public Health Engineering Section

IN 1919 less than half of the 48 states had engineering sections in the state departments of health. But, within the decade following, all but four or five of the least populated states had public health engineering divisions, and since then there has taken place a steady, progressive enlargement of engineering organizations in the state health departments. The advance in this type of state work has continued with increasing momentum up to the present day. Before this movement began in 1919, the situation, in the majority of the states of this country, was such that haphazard, ill-planned water and sewage works would be installed by cities and towns; uncontrolled pollution of streams was common; and there was little state direction or supervision of major environmental health problems relating to water supply, sewage, milk, foods, mosquitoes, etc. There were of course, some notable exceptions to this general picture, particularly in the few commonwealths where state health engineering supervision was given an important place.

This brief account of the transition period in state public health engineering work is here presented in the belief that it will help make understandable the present status of public health engineering services in the municipalities. The initial move toward this widespread advance in engineering services of the

states did not in general come from the individual state health officer. It got its impetus from many sources, such as the surveys of state health work conducted by the U. S. Public Health Service, the focusing of publicity on calamitous results where this supervision was lacking, the organization in 1920 of the Conference of State Sanitary Engineers, the repeated presentations of the need for this supervision at the annual conferences of the State and Territorial Health Officers, and, finally, the offer of funds and technical assistance by the U. S. Public Health Service and the Rockefeller Foundation, for inaugurating such work in the states.

The situation today in city public health engineering divisions does not approach the level that had been reached by the states for this work by the year 1919. It is, on the whole, comparable to the 1895-1905 period when the first few engineering divisions in state health work were being established. Professor Charles Gilman Hyde¹ reports as a result of his study and collection of data, that he found in 1934 "there are probably not more than 30 public health engineers employed in 24 city health departments in 13 states." At the same time he points out that there are 320 well organized, full-time city health departments. It is Professor Hyde's conclusion that each of the 211 cities with a population of 50,000 or over "should enjoy the benefit of the full-time services of one or more sanitary engineers in an or-

* Report of the Committee on Municipal Public Health Engineering.

ganized, properly equipped bureau." In summarizing the picture he adds, "It is only recently, and as yet in a pitifully small way, that appreciation of the value of such service has been recognized and expressed by the employment of public health engineers in the smaller units of public health administration: county, district or unit, and municipal."

It was for the purpose of finding out if there had been any marked change in this situation, that a brief questionnaire was sent out by the Municipal Public Health Engineering Committee this past summer to the state sanitary engineers, to gather information about public health engineers in municipalities. Each state engineer was asked also to give information about local unit health departments where the population was at least 60 per cent urban. Replies from 44 states were received. The data indicate that in July, 1938, there were employed in the health departments of 53 cities and urban units, 66 public health engineers. This represents an increase of more than 100 per cent, in the past 4 years, in the number of cities employing public health engineers. Most of this increase is made up from the number of municipal health engineers added to local health departments in the 4 states: Minnesota, Missouri, Ohio, and Texas. In one state, Alabama, where the local health work is entirely on a county basis, with no municipal health department, it was reported that there were 29 engineering sanitary officers in county health units. The number of engineers employed in counties with predominantly urban population in Alabama was not furnished; thus, this figure is not included in the above totals.

The present situation, in this phase of municipal health work, may be summarized by pointing first to the fact that in only one in four of the 211

cities with population of 50,000 or over, are public health engineers employed, and secondly that of the 37 largest cities with a population of 250,000 or over, only 14 have one or more public health engineers in their health departments.

The question whether or not the larger cities in this country have a need for the services of engineers in their health departments is ably discussed in the paper of Professor Hyde cited above, and also in papers by Joel I. Connolly,² and James L. Barron.³ In these reports one finds accounts of the engineering bureau's activities, which range over a very wide field—from water supply and waste disposal matters, to the problems of insects and nuisances; from control of milk, food, and air supplies, to projects in industrial hygiene, plumbing, and housing sanitation. Some health workers might question the soundness of the principle of having a health department carry on, through its engineering bureau, the supervision of all these environmental health matters, asserting, perhaps, that this work is already covered by other agencies, such as, for example, the water department, or that it could be directed by non-engineering personnel.

A discussion of some of the activities of an engineering bureau of a city health department will perhaps explain why our committee shares with Professor Hyde the belief that each of the 211 cities with a population of 50,000 or over "should enjoy the benefit of the full-time services of one or more sanitary engineers in an organized, properly equipped bureau."

In the field of water supply, the local health official has indisputably the responsibility for the safety of the public water supply, even though the planning, construction, and operation of the system is up to another department or rests with a private corporation. An experienced health officer would hesi-

tate to shift this responsibility by accepting the assurances of other departments of the city or state, without a check directly under his own supervision. He would want his department to have a collateral supervision and a continuous check on this most important source of disease. The unfortunate position in which the local health officer may find himself, as a result of the failure of his department to check conditions relating to a water supply was strikingly revealed in the investigations and hearings concerning the Croydon (England) typhoid epidemic of 1937. In addition to the regular public water supply, the local health department regulates directly many small subsidiary water supplies, such as private wells, springs, etc., which are used for domestic purposes or at food establishments. The complicated hydraulic and sanitary problem of checking the hazards to the consumers' water supply from plumbing defects in buildings, has been one of the recent jobs brought to local health departments, or, more correctly, a job that has been returned to the health department.

With respect to the disposal of wastes, the city health department has somewhat the same function as with the general water supply. The actual collection, treatment, and final disposal of sewage, garbage, and other wastes are the work of other departments, but it is the health official's task to see that the necessary health requirements are fully met in carrying out these city functions. Here again the health official will need the help of his engineer to insure that water supplies are not endangered, that beaches and other recreational areas are not polluted, or that nuisances from garbage or other wastes do not occur.

In the field of food protection, local health departments are confronted with ever widening responsibilities. The outstanding health achievement in the

thorough, exacting protection of milk, attained in various cities, has led health workers to give similar specialized attention to many other food problems, and to the methods of their preparation, *e.g.*, shellfish, baked custard products, cheese manufacturing, syrup and jelly manufacturing, restaurant sanitation, etc. That the public health engineer's part in the achievement in milk sanitation has been of major significance, is clearly evidenced by his work on the problem of correct pasteurization. His share is apt to be of like importance in the further advances in food control, and in the sanitation of food processing plants. In the very large cities where separate bureaus for food control are warranted, the direction of such work need not be limited to engineers. It may properly be held by one of the other specially trained sanitary workers.

In industrial hygiene and sanitation, the demands upon the city health department are becoming ever more pressing. The control of dust, fumes, excessive temperatures, harmful chemicals, etc., in shops and factories is largely a job for the engineer. Similarly, pollution of the general atmosphere in most large cities, from industrial operations and the burning of fuel, presents a control problem which the local health department must to a large extent take over, and for the solution of which engineering guidance is obviously a prerequisite.

The activities of the health department in mosquito control both for malaria eradication and pest elimination have largely resolved themselves into drainage and land grading operations or the manipulation of impounded waters. In other problems of pest control, such as rodent eradication, fumigation, and disinfection, the effective measures are properly formulated and supervised by the local public health engineer.

It is not believed necessary to

lengthen still further this list of local health services of an engineering nature. It should by now be obvious that in modern cities environmental health factors have reached such a large number, and are of such technical complexity and importance as to warrant an engineering service. New products, new processes, new machines and structures; new ways of working, playing, living; all ceaselessly changing and modifying every problem—require renewed investigation and continuous control of ever present hazards by health minded, technical experts, if the public health is to be safeguarded intelligently. Because of his specialized training and experience in subjugating the forces of nature for the benefit of man, the public health engineer is well qualified to carry on and direct the activities in the various phases of the environmental health field. He is, furthermore, best fitted to correlate the health influencing activities of official public works departments, the public utilities, and private industry into a coöperative, unified, efficient community environmental health program. This job is beyond the capacity of the sanitary inspector. The non-engineer health worker, finding himself on unfamiliar grounds, would be handicapped in initiating this work. But the trained public health engineer can directly stimulate vast amounts of public health work in other departments and agencies, for he can talk the language of the engineers who are the ones planning, building, and operating the basic physical works

of the city. The committee holds that the cost to a city of appointing one or more public health engineers would prove to be a sound investment.

It is also the committee's belief that the old as well as the new fields of environmental health which are best handled by engineers in municipal health departments, should be brought to the public's attention. In this education work the federal and state health engineers can play a rôle of paramount importance. They, themselves, are becoming more aware of the outstanding place the municipal health engineer occupies in the community's health protection, and they can bring this information to the citizens of their state. To make up the lack of municipal public health engineers, especially in the larger cities, is in the opinion of this committee, one of the more immediately and definitely necessary tasks to be included in any national program for better health protection.

REFERENCES

1. Hyde, Charles Gilman. The Trained Public Health Engineer in Public Health Departments. *A.J.P.H.*, 26, 7:697-710 (July), 1936.
2. Connolly, Joel I. The Function of the City Sanitary Engineer. *Munic. San.*, 1, 1:22-30 (Jan.); 2:83-88 (Feb.), 1930.
3. Barron, James L. Environmental Sanitation as Practiced in a New York County. *Munic. San.*, 4, 6:194-196 (June), 1933.

SOL PINCUS, *Chairman*
AIMÉ COUSINEAU
ALFRED H. FLETCHER
ARTHUR E. GORMAN
HENRY C. LANE
F. GARDNER LEGG, JR.

Plumbing*

Public Health Engineering Section

THE Joint Committee on Plumbing during the past few years has devoted its studies to the health hazards involved in plumbing installations due to interconnections between drainage systems and water distribution systems in buildings. It has pointed out that there is a growing recognition of the folly of permitting contamination of drinking water in buildings through faulty plumbing installations after spending huge sums to deliver water of safe sanitary quality to the mains in the street.

The large number of investigations made during the past few years by federal, state, and municipal health authorities, and by associations of plumbers and manufacturers have produced unquestionable evidence that designs and methods of installation commonly used with many plumbing systems and fixtures have been responsible for localized pollution of water supplies in buildings. Such pollution frequently results from back drainage or back siphonage into water lines of the contents of these fixtures or the contents of a water pipe or drain into which these fixtures discharge. In most of these investigations special emphasis has been laid on hospital installations, where the maximum of care against infection is essential, but the evidence collected has general application to all plumbing installations whether in a large institution or a private residence.

So much publicity has been given to the health hazards involved in defective plumbing systems and fixtures, and as to how contamination of water supplies in buildings may occur through back siphonage caused by the creation of partial vacuums in water distribution systems, that it does not seem necessary to discuss these matters in this report.

Notwithstanding this publicity, faulty plumbing installations are still being made and potentially dangerous types of fixtures are still being manufactured. Although many plumbing inspectors are well informed, there are still some who do not know how to correct the conditions they find. Some water works officials have not as yet recognized the danger of polluting their water supplies from such interconnections, or the importance of proper pipe sizes within buildings in preventing the occurrence of a partial vacuum. There are also other very important plumbing hazards, such as, for example, leaking sewers and drains located over places where water, ice, or food are stored or handled.

In considering measures to prevent or eliminate health hazards due to defective plumbing and to comply with the requirements of plumbing codes, a distinction may properly be made between proposed new installations and existing or old installations. In new installations the maximum protection can and should be obtained, because many protective features can be embodied by the architect during design,

* Progress Report of the Joint Committee of the Conference of State Sanitary Engineers and the Public Health Engineering Section, A.P.H.A.

and the selection of individual fixtures, satisfactory types of which are available, is unrestricted so that protected types can be used. In old installations the incorporation of desirable design features is often precluded by existing structural conditions, and as the fixtures are already in place, they cannot be completely protected except by replacement. Consideration should be given also to the relative importance of various defects from a health standpoint; e.g., a submerged inlet on a wash basin is less dangerous than on a bedpan washer. Furthermore, one should not lose sight of the fact that the frequency of vacuum may vary both as between different buildings, and between different floors of the same building.

In undertaking a campaign to eliminate health hazards caused by faulty plumbing fixtures a survey of existing installations should first be made. This survey should be made by a trained personnel. When the survey has been completed, a table listing the unprotected fixtures should be prepared, and recommendations for the correction of the conditions found should be made. When making recommendations it should be borne in mind that some fixtures are interconnections at all times, others are interconnections under normal operations, while others become interconnections under certain conditions which may exist at infrequent intervals. In dealing with existing installations the worst conditions should be corrected first. A definite program should be worked out. The corrections should be made as soon as practicable and, if possible, without unduly curtailing the normal daily routine of the occupants of the building in which the protective devices are being installed.

A large amount of work has been done in the testing and development of fixtures which will prevent the pollution of water supplies by back siphonage. New developments are constantly

taking place. It is believed, however, that sufficient progress has been made so that fairly definite recommendations can be made.

The problem of preventing contamination of water through plumbing defects involves both material things such as fixtures and the more intangible human equation. Properly-designed fixtures, adequate pipe sizes, and well trained plumbers to install them, are equally necessary.

FIXTURES IN NEW BUILDINGS

In new buildings, hazards to health may be eliminated by requiring permits and the submission of plans. It is necessary to have

1. Plans covering both fixture design and piping layout and sizes, approved before building permits are issued, followed by
2. Requiring the construction and installation to be done by qualified plumbers bonded and licensed under a system requiring proof of ability to recognize and avoid dangerous connections
3. Having the job inspected by conscientious, competent plumbing inspectors, both at the time of erection and periodically thereafter
4. Identifying by distinctive colors, water piping systems conveying potable water and those carrying water which has been polluted or is subject to pollution, to prevent confusion during subsequent repairs or replacements
5. Requiring plan approval, permit and reinspection whenever changes are made in a plumbing system

Direct connections between potable water supplies and unsafe water supplies may, in general, be avoided by maintaining an unenclosed air gap of sufficient size between the point of discharge from the potable supply pipe and the highest level to which sewage or non-potable water can possibly rise. Additional measures for preventing leakage of unsafe water into a supply used for drinking purposes are the prevention of submerging of any part of a potable water supply pipe in any sewer or container holding non-potable water

and, conversely, by preventing pipes carrying impure water or sewage from passing through or over containers of safe water. This principle has been applied, for example, in dual water systems, where the potable supply is piped outside of a tank up to a point above the top of the tank, discharging above the rim, while the non-potable supply may enter the tank at the bottom, if desired.

It has been suggested that it would be practicable in new buildings to run special pipes to flush valves of toilets and to no other fixture from an elevated tank used solely to supply this piping system, with the potable water discharging into the tank at an elevation above the rim. The object is to assure that if siphonage should occur, no fixture except a toilet would be supplied by the contaminated water and, at the same time, avoid placing a protective device on every individual flush valve. In favor of such a plan there have been urged the following considerations:

1. Economy of installation
2. No moving parts to stick
3. Quietness of operation
4. No "spitting" through openings

Opposed to this plan is the fact that it is not foolproof. Changes in fixture locations may lead to connections to the most conveniently available source of water, without regard to its safety. Having two water systems, one of which is actually or potentially contaminated, invites interconnections between them. Therefore, this arrangement is not recommended by this committee.

A suitable device for flushing water-closets and assuring that siphonage from them into the water supply will not occur, is a flush tank meeting the following conditions:

1. The bottom of the flush tank higher than the rim of the water-closet
2. The tank overflow large enough to carry away readily the full flow of water through

the supply pipe to the fixture when the valve is wide open and the pressure is the maximum available.

3. The overflow drained into a suitable fixture, thereby removing possible temptation to plug the overflow

4. The discharge opening and all other openings in the water supply to the tank not less than one inch above the highest possible level of the water surface in the tank

5. No part of the water supply pipe, valves, or fittings submerged in the water within the tank

6. Free access of air into the flush tank above the water surface without passing through the water-closet

7. The tank so constructed and covered that foreign materials cannot accidentally be introduced into the tank

8. Provision made for adequately hushing the sound of the water as it fills the tank

9. The cover fastened on the tank in such a way as to require the use of tools to remove it.

Attention is invited to the fact that the customary flush tank, equipped with a hush-tube discharging below the water level, fails to meet these conditions in several respects. There does not appear to be any insuperable obstacle in supplying a flush tank which will meet the conditions named.

Manufacturers' representatives, with whom this matter has been discussed, point out that the second condition mentioned, namely, that the tank should have an overflow large enough to carry away readily the full flow of water into the tank, is possibly the most difficult to meet. That is because the trend is toward higher rates of flow into the tank to permit quicker refilling. Even old ballcocks, in many instances, when the float is held down, will admit water faster than the customary overflow will remove it, and increasing the rate of filling would necessitate still larger overflow pipes. Furthermore, such large overflows are not desired by manufacturers who wish to keep the flush tanks small, so as to compete more easily with flush valves in small toilet rooms.

FIXTURES IN EXISTING BUILDINGS

When one considers the problems of making the plumbing safe in an existing building, there is usually less latitude than in the design of a new one. Extensive revamping of the plumbing design is ordinarily prohibitive in expense. There is possible the use of flush tanks meeting the requirements already outlined. In many cases, there may be great difficulties in getting such tanks installed, because

1. The necessary space may not be available for a flush tank
2. Objections are raised against waiting for a tank to refill before it becomes possible to flush the fixture again
3. The owner feels that he has an investment in his present equipment which he is loathe to lose
4. The margin of safety afforded by such a tank over a protected flush valve is not very obvious to owners generally.

When faced with such a situation, the health official may find himself between the horns of a dilemma. If he insists upon a complete physical separation of the potable supply of water and the fixtures, the difficulty of securing the remedy may unduly delay, if not altogether prevent, his success. On the other hand, if he does not secure any improvements, he fails to protect the public health.

At such a time, one may perhaps consider the possibility of a compromise upon some less complete means of protection which gives greater promise of ready acceptance, on the theory that half a loaf is better than none. It may be expedient to permit the use of devices, which, though giving a considerable degree of confidence that siphonage will not take place, yet provide less than complete protection. There are many such devices and there will undoubtedly be others. Among them are vacuum breakers for application to the discharge side of the flush valve.

Many, if not all, such vacuum breakers draw in air to prevent siphon-

age and may not only draw air through the ports provided for the purpose, but through the water-closet as well. It is considered undesirable to obtain air from the latter source for entry into a pipe conveying potable water. Also, if the water surface in the fixture is at suitable elevations, a spray of water may be carried into the water pipe through certain vacuum breakers, by a stream of air drawn from the toilet. Therefore, the more conservative view has been that a loose disk or other similar device should be used in addition to the vacuum breaker, not with the vain hope that such a device will remain tight, but with the expectation that even though it does not usually remain tight, the effect of the device will be to reduce sufficiently the velocity of air entering through the rim openings, that no spray or particles of solid matter will be carried into the water supply pipe. Such a device also may serve as a second line of defense temporarily, pending repairs if the vacuum breaker gets out of order.

The committee believes that in existing buildings where the difficulty of securing complete protection is so great as to be out of proportion to the benefit, certain combinations of vacuum breakers with loose disks or similar devices, may, in the discretion of the health authority having jurisdiction, be permitted without approval, and with no guarantee that permission to use them will continue indefinitely.

Building owners occasionally ask a health authority to agree that, if they will put in vacuum breakers and loose disks to correct potential health hazards upon their property, the health official will never ask them to make further changes. In the present state of development of knowledge and invention in this field, any guarantees should be made by the manufacturer rather than by the health officer.

When hydraulic conditions in a

building, as determined by tests made by competent personnel, indicate that the likelihood of a partial vacuum occurring is extremely remote, and where it would be impracticable to meet all the usual requirements, health authorities may be warranted in permitting the omission of the loose disk or similar device (but not the vacuum breaker), upon the water pipe leading to non-syphon-jet types of water-closets. Syphon-jet types of toilets have constantly submerged water inlets and, therefore, in most cases, present a greater health hazard than most simple flush-rim water-closets without a syphon-jet, in which the water inlets are only occasionally submerged, as when a stoppage of the drain occurs.

The results of tests of the hydraulic conditions in any building should be presented to the health authority having jurisdiction before permission to omit the loose disks is granted.

A convenient form of loose disk for use with a flush valve equipped with a vacuum breaker is the "non-return stop." A number of combinations of such loose disks with vacuum breakers have been tested. Others no doubt will be tested from time to time.

It is the belief of competent investigators, in which this committee concurs, that in the present state of the art, a health official may permit in existing buildings, without approval or guarantee of any kind, expressed or implied, devices which are to be installed for the prevention of siphonage from fixtures through flush valves into potable water supply systems, provided these devices are designed, constructed, and installed in accordance with the general principles set forth below, and provided, further, that they are properly maintained in good condition and have passed suitable tests:

1. The bottom of the vacuum breaker shall be at least 4" above the spill line of the fixture

2. The breaker shall be of non-corrodible material and shall be so designed as to be able to prevent the formation of any partial vacuum of more than 1" of water in the flush valve tail-piece, regardless of the condition of the flush valve

3. The air valve shall be so constructed that it can be inspected or renewed with a minimum of expense and labor

4. A complete cycle of all moving parts, if any, shall be made each time the flush valve in the supply piping is opened and closed

5. Vacuum breakers shall not leak under any degree of back pressure

6. Vacuum breakers shall operate quietly and not prevent adequate flushing of the fixture

7. Little or no air shall be drawn from the fixture to break a partial vacuum, and especially at no time shall the velocity of any air drawn from the fixture be enough to permit the withdrawal of any solid particles or liquid from the fixture

There are devices on the market which, while in good repair, have fulfilled the conditions outlined above when subjected to rigid laboratory tests. It is possible, of course, that some weaknesses may develop after these devices have been in operation for a period of several years, which are not apparent at this time, or that their use with a type of water which causes increases in back pressure, through liming up of water passages, may develop difficulties. Therefore, any permission granted for their use should be revocable.

TENTATIVE SPECIFICATIONS

Following are descriptions of certain devices which appear to meet the above conditions at the present time, when used with loose disks, as previously mentioned.

A. One type of vacuum breaker for use on the outlet end of direct flushing valves is an assembly of a ring-type disk holder unit concentrically around the tube which forms the inlet end of the vacuum breaker.

The disk holder is normally in position to prevent full force of a vacuum in the water supply line from acting on the

contents of the water-closet or other fixture which the flush valve supplies. Under this condition the air-ports are fully open.

When the valve is flushed, the disk holder is pushed up by the flowing water and closes the vents, or air-ports. The disk holder drops to normal position as soon as water stops flowing. It completes a cycle of these movements each time the flush valve is operated, and does not interfere with proper flushing of the fixtures.

B. Another type of vacuum breaker has a 1" opening to the atmosphere, with air valve constructed so that it can be inspected or renewed without disturbing the flush valve or flush connections. The air valve seat is not over 1" in diameter. The air valve moves freely and clears the nearest wall by $\frac{1}{8}$ " so as to prevent sticking or wear. Vacuum breaker places no material restriction on rate of flow, and the moving parts go through the entire cycle each time the fixture is flushed.

C. Still another type is a "Venturi" vacuum breaker for use on the outlet end of direct flushing valves. In the inlet end of the vacuum breaker, it contains a non-corrodible disk, having 4 slotted openings near its outer edge, and a $\frac{1}{4}$ " diameter hole through its center.

When the valve is flushed, the water flows through the openings in the disk, into a $\frac{3}{4}$ " diameter tube and then into the fixture. This tube is surrounded by a slightly larger tube, leaving an annular opening between the tubes. When subjected to a sustained vacuum of $\frac{1}{2}$ atmosphere, a sufficient quantity of air is drawn through 2 slotted openings in the $1\frac{1}{2}$ " outer pipe, then through the annular space between the tubes, and finally into the water-supply line to prevent the water from rising more than 1" in the tail-piece of the flush valve.

The committee will add descriptions of other vacuum breakers to this list

from time to time, as sufficient additional information concerning them becomes available.

Because of the differences in back pressure in certain water-closets, several different types of vacuum breakers are made by some manufacturers. It is important that the proper type be used for the fixture which it serves.

With certain waters, liming up of the passages in a water-closet may occur, requiring a change from one type to another after a period of use, to avoid "spitting" of water through the air-ports when the fixture is being flushed. Therefore, permission to use a vacuum breaker and loose disk combination should be based not only on having it installed and maintained properly, but also upon its continued suitability to the purpose. If water spurts from the air-ports during flushing, the vacuum breaker cannot be considered suitable, because it will not be long before it occurs to someone that closing the ports will save a lot of mopping of the floor. With the ports closed, the usefulness of the device vanishes.

As an additional safeguard, a stable type of flush valve should be used in all cases, inasmuch as there is a great difference between the tendency of various types of flush valves to open under a negative head. By "stable" is meant that when the valve is in the closed position, a partial vacuum in the water supply pipe tends to seat the valve more firmly.

A water-closet of the side-spud type, wherein the water connection is below the flushing rim, is more subject to siphonage than other types. Bowls of this type should not be permitted in new installations and should be replaced when any general revamping of existing plumbing is undertaken. Special care should be used to safeguard the water supply in such cases by the use of loose disks to supplement the vacuum breakers. The submerged-inlet type of

integral spout lavatory and the bathtub with submerged inlet are other fixtures which should not be sold or installed in future. Manufacturers should cease to encourage the production and sale of side-spud toilet fixtures, and the making of these and other submerged-inlet fixtures unquestionably will cease if the public refuses to buy them.

The size of a safe air gap has been given considerable study. Inlets should be raised above the top of the fixture a distance equal to not less than twice the diameter of the water inlet. The Minnesota State Board of Health suggests the following minimum distances: lavatory, 1"; laundry tray, 1½"; bathtub, 2".¹ The University of Iowa and the Board of Health of Chicago, working independently, have also come to regard these minimum distances as adequate for the prevention of siphonage. These air gaps should be measured vertically from the elevation at which the water would overflow onto the floor, to the level of the bottom of the water inlet. "Overflows" connected to the drain are not considered in determining the air gap.

SUMMARY AND CONCLUSIONS

All plumbing fixtures should be proof against siphonage. In new buildings it is practicable through the use of definite air gaps to give 100 per cent protection against back siphonage. In existing buildings local conditions should determine the degree of protection which is feasible and practicable. These local conditions may be ascertained through inspections and tests made by

qualified personnel. Certain vacuum breakers which have been tested and found to give a high degree of protection are described. Safe air gaps for certain common types of fixtures have been determined. Only air gaps are recommended by the committee for the prevention of siphonage, but substitutes may be permitted without approval where conditions with respect to pressure in the pipes and type of fixtures installed warrant their use.

Action should be taken by appropriate state authorities to prevent "dumping" of unsafe fixtures barred from cities upon small villages and rural communities.

Water superintendents should cooperate with the health authorities in preventing future sources of water contamination from plumbing, and in locating and eliminating existing ones.

The plumbing industry should help by refusing to manufacture, sell, advertise, or install unsafe fixtures and devices.

The public health workers should seek to educate the public on the need for safe plumbing, encourage further studies, and promote more adequate and effective plumbing inspection.

REFERENCE

1. *Plumbing in Relation to Public Health*. Minnesota State Board of Health, 1938.

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Shellfish

Public Health Engineering Section

IT was decided the committee's report this year should cover procedures recommended to be followed in determining areas from which shellfish may be marketed directly.

The following report, therefore, is based on the papers and discussion presented at this meeting and on subsequent correspondence with those attending.

FACTORS TO BE CONSIDERED IN DETERMINING AREAS FROM WHICH SHELLFISH MAY BE MARKETING DIRECTLY

Decision with reference to approving areas from which shellfish may be marketed directly should be based on information obtained by technically qualified competent persons, making a careful detailed sanitary survey of the area. This decision should be based upon information obtainable both by physical survey and by bacteriological examination of overlying waters. The water examinations may be supplemented by bacteriological examinations of the shellfish themselves, but wherever the results so obtained are inconsistent with the results of water examinations, the conclusions based on the water examinations should prevail.

The areas from which it is finally decided shellfish may be marketed directly should be separated from the unapproved or contaminated area by a zone or band of water from which shellfish may not be marketed, without first subjecting them to an approved cleansing procedure.

THE SANITARY SURVEY

Adequate maps or charts of the area and of the adjacent shorelines are necessary. U. S. Coast and Geodetic Survey charts are usually admirably

suited for this purpose. On the maps or charts should be shown water depths over the shellfish producing areas, and the location of the natural and the planted areas. All properties ashore, particularly houses and sources of pollution close enough to the water's edge to be significant, should be shown. The locations of public and private sewer outlets, privies, etc., should be plotted. The average quantities of sewage discharged and the degree of treatment it has received should be recorded. The stations at which water and shellfish samples are being collected should be shown.

The principal sources of pollution are usually (1) cities, towns, or small communities discharging sewage and trade wastes, (2) houses situated along the shore, and (3) shipping.

The effects of the contamination from resort places upon shellfish areas should be studied. Summer residents in the vicinity of oyster growing areas are not so much a threat to the safety of the oysters as are residents occupying properties during the active shellfish season. Summer colonies near clam flats may, however, be sources of serious contamination.

Current studies should be made, and the course of floats released near important sewer outlets at several stages of the tide should be plotted when such information is significant.

The probable dilution of contamination with clean sea water should be considered. So also should recentness of contamination. Pollution probably originating from human sources should be considered to be much more serious than that from animals or from cultivated fields or from marshland, etc.

BACTERIOLOGICAL EXAMINATIONS

Bacteriological examinations of water or of shellfish should preferably be made during the actual shellfish season. Since there is a difference between the summer and winter concentration of coliform organisms in some areas where shellfish are taken the year round, the decision should be based upon conditions prevailing when the sanitary risk is greatest. Bottom samples, if taken from very deep water, probably portray with greater exactness and fidelity the actual condition of the water surrounding the shellfish at the time of sampling than surface samples. In ordinary shellfish growing areas, however, wave action and currents may bring about an interchange of bottom water for top water, and vice versa, so that over a period of time there may be little or no difference between top and bottom samples. In practically all instances coming to the attention of the committee this has been found to be the case, even for deep waters. In view of the fact that the top samples can be collected more cheaply and rapidly, and in view of the fact that sewage being fresh water, flows over the salt water rather than under it, top water samples from a practical standpoint are in most instances to be preferred to bottom samples, in that the most highly contaminated portion of the overlying waters is apt to be

sampled. The top water sample should be collected in a sterile bottle, either while held in the hand or secured to the end of a stick in such a manner that with a circular stroke the bottle is plunged to a depth of a foot or two beneath the surface.

A large number of reasonably accurate samples at a given station or in a given area collected at all stages of the tide, are to be preferred to only a few samples more meticulously collected and more precisely and more accurately determined. Adequate care, however, should always be exercised both in collecting and examining samples.

Water samples should be examined bacteriologically according to *Standard Methods of Water Analysis*, current edition, American Public Health Association. One or more tubes in each of three dilutions; namely, 10 c.c., 1 c.c., and 0.1 c.c., should be examined for each sample. In special studies where oyster and overlying water samples are to be compared, five tubes in each of three dilutions may be examined. The results should be recorded as most probable numbers per 100 c.c. of sample. There is no objection to examining more than five tubes in each dilution if laboratory facilities permit. Generally speaking, it is hardly advisable to examine more. For shellfish samples 1 c.c., 0.1 c.c., and 0.01 c.c. dilutions may be employed advantageously. Tables for the numerical interpretation of fermentation tubes results, in terms of most probable number of coliform organism per 100 c.c. of sample, may be made up following McCrady's suggestions as outlined in *Public Health Journal* (Canada), May, 1918, or *Reprint 1621, Public Health Reports*, March 23, 1935.

When water samples are being collected, the date, location, and depth at which the sample is taken should be recorded; the temperature and density of the water in the area should be de-

terminated from a sufficient number of observations, but need not be taken for all samples unless they are spaced far enough apart to make it necessary to do so; the stage of the tide should be stated. This can conveniently be recorded as the number of hours since low water at some controlling point in or near the area. The direction and velocity of the wind at time of sampling should also be noted. Tide predictions for any area can be obtained from the tide tables published by the U. S. Coast and Geodetic Survey, Washington, D. C., or can be obtained from that agency by correspondence. The average bacteriological density at high water and at low water can be reported in most probable numbers per 100 c.c. of samples.

Stations may be established on the chart by the intersection of vertical and horizontal lines drawn at some convenient interval apart as 1,000 ft., 500 ft., etc., the sample being credited to the intersection to which it is nearest. By giving the vertical lines numbers and the horizontal lines letters, each intersection or station can be designated by a letter and a number; for example, 7 A, 10 G, 9 AA, 17 GG, etc.

Sampling stations can also be determined by two sextant angles taken simultaneously between objects on shore whose positions are plotted on the chart. This degree of precision is, however, seldom warranted in taking water samples, but may be at times justified when oyster samples are collected, or may be used to plot positions of the sample collecting boat whenever the course is changed if more convenient determinations of its position cannot be made.

INTERPRETATION OF RESULTS

When an area obviously subjected to more or less direct contamination of human origin as ascertained by float and current observations is thus

studied, restriction lines can be drawn as soon as decision is made regarding the degree of contamination deemed to be sufficient to warrant condemnation. For a number of years regulatory authorities in the United States have assumed that where the contamination shown by the bacteriological samples was probably of human origin and more than 50 per cent of the 1 c.c. portions were positive, they were warranted in prohibiting the taking of shellfish directly from such areas for market purposes. This has been shown¹ to be equivalent to a most probable number of about 150 coliform organisms per 100 c.c. of sample. Where the pollution is definitely not of human origin, a standard of cleanliness established by esthetical considerations which public opinion will support should be set.

Experience with this standard seems to indicate that it is apparently sufficiently rigid to protect shellfish consumers from disease, provided reasonable sanitary precautions are taken by those engaged in gathering the shellfish. In most of the instances in which shellfish have been blamed for the spread of disease, the shellfish became contaminated while being held for market after having been gathered, and were eaten raw on the half shell. There seems to be, however, at least one instance² in which shellfish were taken from waters meeting the standards above set and yet having become responsible for an outbreak of disease, because they were gathered from relatively shallow waters by a typhoid carrier who may not have taken the precautions he should have taken while over the oyster beds.

Unpublished reports seem to indicate that an outbreak may have occurred recently in another state in a similar manner.

These two instances may point to the need for passing all shellfish for the half-shell trade through a cleansing

process after they are gathered unless carriers can be rigidly excluded from the shellfish industry. Sanitary control of shellfish products would then be placed on a plane comparable to that recommended for the production of milk, in that all areas from which shellfish are marketed would first have to attain a minimum standard of cleanliness after which the shellfish taken from there for the half-shell trade would have to be passed through a cleansing or conditioning or storage process in a sense comparable to pasteurization in milk production. While your committee does not believe that the time is at hand when such a rigid standard could be enforced throughout the whole industry, the desirability of striving for such a goal should be pointed out, particularly in the production of shellfish for consumption on the half shell.

Possibly if shellfish growers who take these precautions were permitted to market their product under a preferential branding or labeling, such as "Grade A Cleansed," or "Grade A Conditioned," the day when oysters could be marketed on the half shell only after having been grown in clean areas and cleansed or conditioned in approved plants, would be hastened.

ZONE BETWEEN CLEAN AND CONDEMNED AREAS

This zone has not always been clearly defined in the past. We stated above that when more than half of the 1 c.c. portions of the water samples were positive, corresponding to a most probable number of 150, the taking of oysters for market directly from such areas should be prohibited unless subjected to some approved cleansing procedure. This locates the off-shore boundary for the zone. The in-shore boundary of moderately contaminated areas from which shellfish may be taken for cleansing in shellfish cleansing

plants has been set in some jurisdictions by the line on which 50 per cent of the 0.1 c.c. portions of the water sample are positive. This is, of course, an arbitrary line. Experience over a period of several years seems to indicate that it is safe for soft clams, and this line might be considered as forming the in-shore boundary of the zone.

Soft clams found inside the above line have been considered as being too badly contaminated to be suitable for cleansing in shellfish cleansing plants. It is believed the same standards may be applied to oysters.

CONCLUSIONS

Additional experience is needed before one can say with certainty that the standards above suggested will always result in producing shellfish entirely safe for consumption. It is believed that a conservative course to follow has been laid out above, and that it can only be modified with safety after sufficient further experience.

Those desiring to liberalize these standards should remember that the best interests of the shellfish consumer must always be borne in mind by the shellfish producer if his business is to be placed on a permanently successful basis, and should not ask the consumer to take chances. Even though it cannot be proved that the use of shellfish from sewage contaminated areas causes sickness, such taking is esthetically objectionable.

With respect to waters from which shellfish intended for the half-shell trade—and therefore always eaten raw—may be taken, your committee is of the opinion, in view of the difficulties encountered in enforcing sanitary regulations to be observed by those engaged in gathering and marketing such shellfish, that before they can be considered to be free of all possibility of spreading disease, they will have to be gathered from clean areas as outlined above, and

then be passed immediately prior to shipment through a properly operated state supervised and licensed, cleansing or conditioning plant.

In bringing about this improvement, your committee is also of the opinion that permitting such packers or shippers to label or brand their product with a label, brand, or tag issued by the state and protected against imitation, would hasten the universal adoption of this procedure without at first actually making it mandatory. The committee should keep in close touch with the results being obtained at shellfish cleansing plants, both in this country and abroad.

The grading of shellfish products, similarly to the grading of milk and milk products, may be a subject worthy of future study and report by your committee.

NOTE: The committee desires to express its appreciation of the helpful criticisms received from Sol Pincus, Deputy Commissioner, New York City Health Department; H. N. Old, District Engineer, U. S. Public Health Service, New Orleans, La.; Warren J. Scott,

State Sanitary Engineer, Connecticut Department of Health; Walter J. Shea, Chief, Division of Purification of Waters, Rhode Island Department of Public Health; A. P. Miller, District Engineer, U. S. Public Health Service, New York, N. Y.; James Gibbard, Department of Pensions and National Health, Ottawa, Canada; C. A. Perry, Director of Laboratories, Maryland State Health Department; Dr. G. H. Coombs, Director, Maine Department of Health and Welfare; and others who took part in the discussion and correspondence leading to the preparation of this report.

REFERENCES

1. Crohurst and Sullivan—Chesapeake Bay Study, U. S. Public Health Service, Dec., 1934 (Mimeographed).
2. Ramsay, McGinnis, *et al.* *Pub. Health Rep.*, Sept. 14, 1928.

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House Trailers and Trailer Camp Sanitation*

Public Health Engineering Section

HOUSE trailers and the many problems created by their widespread use continue to be of interest to public health officials and many others.

The public health principles involved in the control of house trailers and trailer camps are basically the same as those encountered in the sanitation of tourist camps having cabins and camping facilities and were discussed in the committee's 1937 report.¹ These factors pertain to sewage and waste disposal, water supplies, milk and food supplies, control of contact infections, and the control of insect-borne diseases. The opportunities for the pollution of water supplies by the promiscuous dumping or discharge of sewage and wastes from house trailers have been obvious. The necessity for safe water and milk supplies for house trailer occupants is apparent also. Proper spacing may be of great assistance in controlling the spread of certain communicable diseases as well as controlling the spread of fires. Persons traveling from areas in which malaria or other insect-borne disease are epidemic or endemic might readily disseminate infection in far distant areas, and, similarly, people from areas free of certain insect-borne diseases might easily contract such diseases in regions that constitute reservoirs of infection.

To the end that the factors outlined above may be brought under reason-

able control, many public health officials have expressed a desire for a set of uniform, recommended regulations. It is the purpose of this report to present rules and regulations for consideration which your committee believes will suffice for the purposes outlined.

TREND IN HOUSE TRAILER USE

It is difficult to obtain reliable statistics pertaining to trends in house trailer use. Business depression undoubtedly affects all forms of travel, including house trailers. Some observers report a decrease in tourist travel in years just preceding events like the Chicago world's fair in 1933-1934 and the scheduled world's fairs in New York City and San Francisco in 1939. Weather certainly exerts some general influence on travel.

From observations in the far west and in Yellowstone National Park,[†] it seems that tourist travel of all sorts as well as travel via house trailer decreased in the western part of the country in 1938 as compared to 1937. Of the motorists who entered Yellowstone in 1936, 1.23 per cent towed house trailers; in 1937, 1.76 per cent; and in 1938, 1.5 per cent. In this group 10 per cent of the house trailers were being used as permanent living quarters in 1937, whereas in 1938 an increase to 12 per cent was noted. Florida reports an increase in house trailer use in 1938 over 1937.

In the far western states, two com-

*Report of the Joint Committee on Summer Camps and Recreable Places of the Conference of State Sanitary Engineers and the Public Health Engineering Section, A.P.H.A.

[†] See Appendix.

mittee members observed during the summer of 1938 an average of about one house trailer for each 50 miles of travel on main highways, not including units parked in roadside camps. In Florida this many have been observed during the "off" season in the summer months, while in winter many more are seen.

NATIONAL INTEREST IN PROBLEMS

Many organizations have concerned themselves with the house trailer, its use, and the new problems which its use has created. Included in this group are the American Municipal Association² and the Council of State Governments,³ both of whom printed reports in 1937. Other organizations such as the Conference of State and Provincial Health Authorities of North America, the National Safety Council, The American Association of Motor Vehicle Administrators, the Society of Automotive Engineers, the American Camping Association, and the National Association of Master Plumbers, as well as state and multi-state camp owners associations have taken active interest in developments. Papers were presented at both the Western Branch and Southern Branch, A.P.H.A. annual conventions by members of this committee.

The California Camp Owners Association and the National Association of Master Plumbers have gone on record as favoring the installation in house trailers of standard plumbing equipment provided with traps and vents and having standard couplings for connections to sewers.

SPECIFICATIONS FOR HOUSE TRAILER CONSTRUCTION

Although it would be nearly impossible to regulate the construction of all house trailers, the larger manufacturers might be induced to follow reasonable, uniform specifications for the installation of water tanks, toilets, sinks, waste

tanks, and drainage outlets in accordance with recommendations of the American Public Health Association and the Conference of State Sanitary Engineers.

It has been suggested by some persons connected with the manufacture of house trailers that facilities be installed at gasoline service stations for the purpose of emptying house trailer tanks containing sewage and other water-carried wastes. The further proposal has been made that such stations provide parking space for house trailers on the basis that camp operators are not warranted in making the expenditures necessary for house trailer accommodations on the basis of probable return on their investment. Such a plan is predicated upon the service station operator being able, by reason of probable sales of gasoline and similar products, to obtain more business from house trailer occupants stopping on his premises.

Your committee fails to see how or why gasoline service station operators could afford to install satisfactory sanitary facilities and make a smaller charge than camp operators. Special facilities are needed for house trailers and trailerites should be willing to pay a reasonable charge for the service provided.

There is lack of agreement among health authorities as to whether or not the use of chemical or septic tanks on house trailers should be permitted at all. Certainly no such units should be equipped with overflows or flushing valves which might discharge on to the highway or ground. The most objectionable feature about septic or chemical tanks is the ease with which they may be dumped. Neither specifications nor standards for tank construction are included in this report because it is believed that their installation should not be encouraged until better protective devices are available. Most states

regulating trailer camps do not permit the use of toilets in trailers while parked in camps but expect house trailer occupants to use camp facilities. The extreme difficulty in completely enforcing such a regulation may be readily appreciated, especially in so far as the use of chemical toilets is concerned.

The following construction specifications are suggested:

HOUSE TRAILER SPECIFICATIONS

1. *Water Storage Tanks*

a. *Removable Tanks*

(1) Openings, filling, and pouring spouts shall be protected from contamination by adequate covers.

b. *Stationary Tanks*

(1) Overlapping caps shall be provided for the protection of the lips of filling pipes and spouts.

(2) Tanks and filling connections shall be located so as to preclude contamination by leakage, spillage, or discharge of liquid wastes.

2. *Sewage and Waste Disposal*

a. *Toilets*

(1) Whenever water flush toilets are provided they shall be installed in compliance with a plumbing code acceptable to the state department and the soil pipe from the toilet shall have a fitting which will allow for its easy connection to a sewer system and which will be leakproof when not so connected.

(2) Chemical toilets shall be constructed of substantial, corrosion resisting material. Instructions regarding correct chemicals, quantity required, and means of disposal of toilet contents, shall be permanently posted in toilet compartment by manufacturer.*

(3) Dry toilets are not recommended.

b. *Sinks, Refrigerator Drains, etc.*

(1) All waste lines from sinks and similar fixtures shall be properly trapped and vented and discharged through one outlet which may easily be connected to a sewer system.

3. *Screens*

(1) All windows, doors, and ventilators shall be fitted with 16 mesh corrosion resisting screen.

4. *Stoves and Heaters*

(1) All stoves and heaters shall be installed and vented in a manner which reduces fire and carbon monoxide hazards to a minimum.

TRAILER CAMP RULES AND REGULATIONS

After considerable study, the committee presents herewith, a set of rules and regulations which may be used by either municipalities or states or both for the uniform regulations of house trailer camps. In areas in which no statutory authority exists for the enforcement of such rules and regulations, they may nevertheless be incorporated as a part of recommended public health procedure. Owners of trailer camps complying with established standards should be given recognition in some way which will assist the travelling public to choose a camp on the basis of health safeguards provided.

RECOMMENDED TRAILER CAMP RULES AND REGULATIONS

Section 1. Definitions

(a) A trailer camp is herein defined as any tract or parcel of land, maintained, offered, or used for the parking or camping of house trailers, house cars, or similar portable units of habitation.

(b) A house trailer is herein defined as any house car, house trailer, trailer home or similar mobile unit which may be used for semi-permanent or temporary living quarters.

Section 2. Supervision

(a) Every trailer camp shall have at least one competent attendant or caretaker whose duty it shall be to maintain the camp, its facilities, and equipment in a clean, orderly, and sanitary condition. He shall also keep a record of all house trailers parked in the camp under his supervision including the name and address of the owner, the license numbers, and state of origin of cars and house trailers, and the number of occupants of each unit.

*The policy of some states is against the use of any trailer camp on highways or in camps.

Section 3. Location and Space

(a) No trailer camp shall be so located that the drainage of the camp area will endanger any water supply. All camps shall be well drained and located in areas free from ponds, swamps, and similar places in which mosquitoes may breed.

(b) Each car and house trailer shall together be allotted a space of not less than 700 sq. ft. Each unit shall abut or face on a driveway or clear unoccupied space of not less than 20 ft. in width, which space shall have unobstructed access to a public street or alley. There shall be a space of at least 10 ft. between every house trailer and any other house trailer, building, or other structure.

Section 4. Water Supplies

(a) An adequate supply of safe water under pressure shall be provided in all parts of every trailer camp. At least one water supply outlet shall be provided for every two house trailer units and in no case shall a house trailer site be more than 100 ft. from a water supply outlet.

(b) Special hoses shall be kept for the filling of water tanks on house trailers and shall be stored off of the ground under sanitary conditions when not in use. These hoses shall be used for no other purpose than the watering of house trailers, and shall be so handled and used that they may not cause contamination of water either in house trailer tanks or in the water supply system.

(c) The dipping of water from open springs, wells, streams, or lakes for water supply purposes is prohibited.

Section 5. Toilet, Bathing and Laundry Facilities

(a) All plumbing in trailer camps shall comply with the state plumbing code, the rules and regulations of the state department of health, and with any or all local ordinances pertaining to plumbing and the disposal of sewage and other water carried wastes.

(b) Water flush toilet facilities shall be provided in conveniently located, well constructed buildings having good, natural, and artificial lighting, adequate ventilation, and floors of concrete or similar impervious material. Concrete curbs extending at least 6" above the floor shall be provided, and the floor sloped to adequate drains. The interior walls and ceilings of such buildings shall

be of smooth material painted with a light colored paint.

(c) Separate toilet facilities marked by appropriate signs shall be provided for males and females, at least one for each 15 persons or fraction thereof. At least one urinal shall be provided in each toilet building for males. (d) Toilet buildings shall be located so as to be within 200 ft. of all house trailer camping spaces.

(e) One lavatory shall be provided for every three toilets or toilets and urinals.

(f) Separate showers with hot and cold water shall be provided for both males and females, and the buildings containing them shall comply with the requirements of Section 5, item b. One shower head shall be provided for each 20 house trailers or fraction thereof. Wooden or cloth mats, grids, boards, or walkways are prohibited.

(g) All floors in shower and toilet rooms shall be disinfected daily by the use of chlorine compounds or other materials in strengths approved by the state department of health.

(h) A laundry room or building constructed as specified in Section 5, item b, shall be provided with laundry trays and hot and cold running water.

Section 6. Slop Sinks

(a) Slop sinks properly trapped and vented shall be provided in convenient locations, at least one within 200 ft. of each house trailer camping space. All slop sinks shall be equipped with water faucets which shall be protected from back-siphonage. Slop sinks shall be so constructed and installed that they may be used for the cleaning of both cans and slop jars.

Section 7. Disposal of Sewage and Other Water Carried Wastes

(a) All sewage and other water carried wastes shall be disposed of into a municipal sewer system wherever possible. In camps in which city sewer connections are not available, disposal shall be into a private system which includes a sanitary means of disposal, the operation of which creates neither a nuisance nor a menace to health and which is approved by the state department of health.

(b) A sewer connection shall be made available at each house trailer camping site for connection to the combined liquid

waste outlet of the trailer. The type of connection used shall conform to all state and municipal plumbing code requirements and the rules and regulations of the state department of health.

(c) No water flush toilets may be used in trailers unless connected to the sewerage system in accordance with state and municipal plumbing code requirements and the rules and regulations of the state department of health.

(d) Facilities shall be provided at each house trailer camp for draining the contents of chemical toilets and sewage storage tanks into the sewer system. Such facilities shall have concrete or equally impervious floors and shall be adequately screened against flies and other insects. The management shall provide for the thorough cleaning of these facilities at least once daily and oftener whenever necessary to maintain them in a clean, sanitary condition.

(e) Wastes from sinks and refrigerators may be discharged into covered, metal receptacles and disposed of into slop sinks without being discharged on the surface of the ground, provided specific approval is obtained from the state department of health.

Section 8. Garbage and Refuse Collection and Disposal

(a) Fly tight metal containers shall be provided for the deposition of garbage and refuse, at least one for every two trailers; one for each trailer is recommended. At least one depository shall be located within 100 ft. of each trailer camping site.

(b) Garbage cans shall be emptied at least once every 2 days and shall not be allowed to become foul smelling or breeding places for flies.

(c) Garbage and refuse shall be disposed of in a manner approved by the state department of health.

Section 9. Cleanliness of Premises and Fire Protection

(a) All camping areas shall be kept free of litter, rubbish, and inflammable material at all times. Hoses and portable fire extinguishers shall be available and in good repair for use in fighting fires.

(b) Fires shall be made only in stoves, incinerators or other equipment intended for that purpose.

Section 10. Electrical Outlets

(a) Electrical outlets for each trailer camping site shall be provided and installed in compliance with all state and local electric wiring codes and ordinances.

Section 11. Miscellaneous Laws and Regulations

(a) In addition to the requirements set forth in these regulations, all house trailer camps and facilities shall be established and constructed in compliance with all existing state and local statutes, ordinances, codes, and regulations.

Section 12. Communicable Diseases

(a) It shall be the duty of all house trailer camp managers to report immediately to the local health officer all known or suspected cases of communicable diseases.

CONCLUSIONS

While the use of house trailers has created some new problems in public health control, fundamentally they are all related to known and tried procedures. Some persons have been unduly alarmed over the house trailer. Dr. Guy S. Millberry, Dean of the College of Dentistry of the University of California, reports⁴ that he travelled 20,000 miles in 42 states and 3 provinces of Canada during 1937 and 1938 without observing any flagrant violation of sanitary precautions by trailerites. He makes the pertinent observation that it is difficult if not nearly impossible to expect to obtain sanitary accommodations in trailer camps much better than those which exist generally in the area in which the camp may be located.

Experience in various states seems to indicate that trailer camps may best be supervised or regulated by existing laws and rules and regulations pertaining to tourist camps. In some instances certain amendments or additions to existing statutes and regulations may be needed. The regulations set forth in this report should be

adequate in most cities and states in so far as they pertain to public health.

Joint Committee

CARL E. GREEN,
Chairman

REFERENCES

1. *Eighth Annual Year Book, 1937-1938*, A.P.H.A. *A.J.P.H. Supplement*, 28, 2:132-137 (Feb.), 1938.
2. The House Trailer; Its Effect on State and Local Government, *Report 114*, American Municipal Association, 1937.
3. *Preliminary Report, Advisory Committee on Uniform Trailer Legislation*, The Council of State Governments, Dec., 1937.
4. Private communication to the committee chairman.

Conference of State Sanitary Engineers

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American Public Health Association

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APPENDIX

TRAILER HOUSE STATISTICS FOR AUGUST 1937 AND 1938

YELLOWSTONE NATIONAL PARK

	1937	1938		1937	1938
1. Number of trailers entering park	777	597	8. Average tax	\$7.29	\$7.81
2. Average number of persons in trailer	3.53	3.89	9. Trailer use, % of total		
3. Average number of days in park	7.23	6.84	a. Continuously as home	10.0%	12.0%
4. Occupation of trailer owner, % of total			b. Vacations	90.0%	88.0%
a. Business		38.7%	10. Trailer equipment, % of total		
b. Farmer		8.5%	a. Heaters	73.8%	64.2%
c. Professional		22.8%	b. Cooking ranges	98.0%	92.0%
d. Retired		13.0%	c. Toilets	20.0%	17.3%
e. Miscellaneous		17.0%	d. Wired for electricity	96.0%	96.0%
5. Average cost of trailer	\$692	\$704	11. Average daily charges outside National Parks		
6. Number of trailers taxed	592	456	a. Electricity	0.27	0.22
7. Number of trailers not taxed	175	141	b. Camping space	0.30	0.28
			12. Average miles travelled per day	261	268

NOTE: Statistics furnished through courtesy of the National Park Service

Recent Development in Waterways Pollution Control*

Public Health Engineering Section

UNDER the impetus of increasing public interest in waterways pollution abatement, many important events have been taking place. Recent years have brought forth a number of outstanding developments that clearly show certain trends in pollution control. Administrative practices have been undergoing analysis, and legislative needs emphasized. Concepts of how best to cope with interstate or major drainage basin pollution problems have been undergoing revision, as evidenced by the present trend away from informal pollution control agreements toward definite compacts between states, backed by state legislation and Congressional approval. Accordingly, in the preparation of this report of your Committee on Waterways Pollution, it was decided that a brief review of some of the more important developments would be timely and stimulate further interest in pollution control measures. References are given to pertinent publicized material. Grateful acknowledgment is also made of data and information obtained from correspondence, unpublished reports and memoranda which were made available to the committee.

EARLY LEGISLATION

In the United States, early legislation looking toward correcting pollution conditions was enacted in Massa-

chusetts. In 1872 the first important investigation was authorized, and this was carried out by the State Board of Health. The precedent established would appear to have influenced legislation in other states, as many subsequent laws for pollution control have designated boards of health to be the administrative agencies. In addition, conservation or game and fish departments, and public service commissions, and other state agencies have been called upon to carry out certain phases of pollution control legislation.

In 1893 Congress authorized¹ the U. S. Public Health Service to cooperate with state and municipal boards of health in the execution and enforcement of the rules and regulations of such boards; and further, in 1912² authorized studies and investigations either directly or indirectly of navigable streams and lakes of the country. The Public Health Service has accordingly extended assistance to states in making pollution surveys, in carrying out water, sewage, and trade waste treatment studies, and in conducting other important activities from the pollution control point of view.

The trend in legislation appears to be away from the inflexible prohibitory type, such as the Oil Pollution Act passed by Congress in 1924, and toward the regulatory type with policy fixing boards or commissions. The Sanitary Water Boards of Pennsylvania and Illinois, the Michigan Stream Control

*From Report of the Committee on Waterways Pollution.

Commission, and the State Committee on Water Pollution of Wisconsin are examples of state bodies created by law to control pollution.

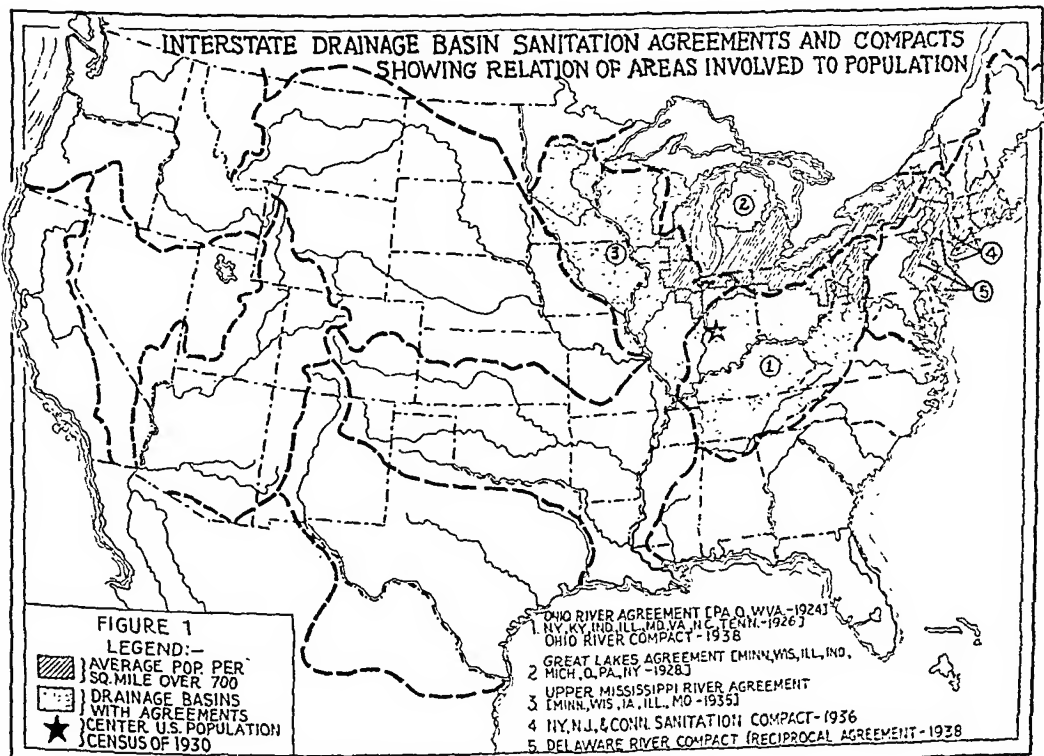
PROGRESS MADE

Creation of these regulatory bodies has aided materially in the development of plans and procedures for curtailing pollution that best fit local needs. Activities of this nature have been more pronounced, as might be expected, in those states where population is the greatest (see Figure I), and major industrial growth has taken place. The progress made has been slow until the advent of federal aid through emergency relief measures passed by Congress in 1933 and subsequently. Many municipal sewage treatment works have been installed under the impetus of federal grants. The progress in reducing industrial waste pollution has been retarded to some extent by technical and economic considerations. The situation as regards industrial wastes has been very ably summed up as follows:

The essential approach to the problem of ridding stream waters of undesirable industrial wastes lies in the active coöperation of the industries involved, always assuming, however, flexible and reasonably administered pollution legislation. The problem cannot be settled by abstract studies on the part of the government, nor by inflexible and arbitrary state or federal legislation. Waste materials are so diverse and complex that each industry and possibly each plant presents a special problem.³

There has been increasing evidence that various industries are recognizing the advantages of group action in solving some of their common problems of waste utilization or disposal, such as the employment of engineers especially for this purpose by the American Pulp and Paper Association and the American Petroleum Institute.

Interstate as well as intrastate pollution control problems have been given attention by states under informal agreements between various state health departments, legislative acts, or compacts (see Figure I), assisted by the U. S. Public Health Service and other



federal agencies. The trend in administration of stream pollution laws has been definitely toward development of comprehensive watershed clean-up programs, the effort being directed toward securing collective, cooperative action to reduce pollution to an unobjectionable minimum.

The indications are that the federal government will more definitely participate in pollution control activities in the future. This especially applies in regard to those problems involving interstate streams.

FEDERAL LEGISLATION DEVELOPMENTS

The past 4 years have seen much effort directed toward securing federal pollution legislation. Following the Dern-Lonergan conference of experts on stream pollution December 6, 1934, proceedings of which are set forth in *Senate Document #16*, 74th Congress, first session, enactment of adequate federal laws was advocated. It was recommended that proposed legislation embody these provisions:

1. Designate a federal agency to study and report on water pollution and pollution abatement projects.
2. Provide for loans and/or grants to public agencies, and loans to non-public agencies for pollution abatement works.
3. Provide that loans or grants be cleared with a water resources planning agency to insure reconciliation of pollution abatement work with the comprehensive utilization and control of water resources in the drainage areas affected.
5. Give congressional consent to negotiation of interstate compacts for pollution abatement.

A number of bills were introduced in the 74th Congress and gradually resolved through numerous hearings and conferences into the amended Barkley-Vinson bill that was passed in 1938 during the closing days of the 75th Congress. This bill was vetoed by the President on June 27, 1938, on the grounds that it

... provides for the direct presentation through the Secretary of the Treasury of the recommendations of the Surgeon General for the authorization by Congress of specific projects to be carried out under the loan or grant-in-aid provisions of the bill, without any opportunity for review by the Chief Executive. Thus the bill provides for the legislative assumption of responsibilities of the executive branch, and therefore, seems counter to the fundamental concept of our budget system that the planning of work programs in the executive agencies and their presentation to Congress in the form of estimates of appropriation is a duty imposed upon the Chief Executive and not one for exercise by the legislative branch.

It would appear that objections raised can be satisfactorily overcome in an amended bill during the next session of Congress. In the meantime, it is evident that further study is being given to federal pollution control legislation. In a recent announcement of a state division of the Izaak Walton League it was stated:

We expect to introduce a bill in the opening of the next Congress which will embrace the following essential provisions:

1. Additional study and research that may be needed and a clearing-house for dissemination of existing information on water pollution and its correction.
2. A definite provision that clean streams remain clean as a safeguard against the threat of additional or new pollution.
3. Adequate authority to administrative agency to enforce compliance with pollution abatement measures when necessary.

With much interest being shown it is likely that federal legislation will be forthcoming in the not distant future.

INTERSTATE COMPACTS

The first interstate compact for pollution control was developed by New York, New Jersey, and Connecticut and with Congressional approval became effective in 1936.⁴ The compact provides for the formation of an Interstate Sanitary District and the establishment of the Interstate Sanitary Commission, with the states pledging cooperation in the control of future pollution and in

abating existing pollution in the tidal and coastal waters in adjacent portions of the signatory states. Enactment of adequate legislation is agreed to by each state which will enable it to put and maintain the waters thereof in a satisfactory sanitary condition, and especially to protect the public health; to remove such pollution as becomes obnoxious or creates a nuisance; to prevent oil, grease, and solids from forming an offensive surface slick on the waters; and to prevent formation of sludge deposits along the shores or in the waterways. Authority is granted the commission, following suitable studies and hearings, to group the designated waters of the district into classes, and provide for standards of cleanliness for each class.

During June, 1938, a reciprocal agreement was entered into by New York, New Jersey, Pennsylvania, and Delaware. This agreement, proposed under the auspices of the Interstate Commission on the Delaware River Basin, was formally ratified and placed in effect by the Departments of Health of the 4 states. Minimum requirements covering sewage, industrial wastes, and other artificial polluting matter are specified.

In the Delaware River Basin, variable factors of location, size, character, flow, and varied uses of the stream has necessitated dividing it into 4 zones, with minimum requirements set up to meet the conditions in each zone. Under the provisions of the agreement all sewage, industrial waste, or other artificial polluting matter will need to be so treated as to produce effluents meeting the established minimum standards.

During October, 1938, the basis for an interstate compact in the Ohio River Basin was formulated, and recommendations were made for suitable legislation, to be enacted by the participating states. This action was taken by a delegation composed of 5 representatives from each state appointed by the

respective governors for this specific undertaking.

This Ohio River Valley Water Sanitation Compact pledges enactment by the individual states of any necessary legislation to place and maintain the waters of the drainage area in a satisfactory sanitary condition. It creates a "water sanitation district" comprising those portions of Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania, Tennessee, and West Virginia, within the Ohio River Drainage Basin, and establishes a non-paid commission composed of 3 representatives from each state and 3 representatives of the federal government. No single standard for the treatment of sewage and industrial wastes is recognized, but it was agreed that facilities provided for treatment of sewage should remove at least 45 per cent of the total suspended solids. The Commission is empowered to conduct a pollution survey of the district, and may issue orders after hearing requiring suitable treatment within a certain time limit. Costs are to be defrayed by the signatory states, respective amounts being computed, 50 per cent on population, and 50 per cent on area of each state within the district. The compact will become effective on ratification by the legislatures of a majority of the states involved.

CONCLUSION

In conclusion, there is definite evidence in recent developments of the widening scope of pollution control measures. Federal legislation very probably will be forthcoming during the next session of Congress. Further interstate compacts may be expected, with much activity in organizing the stream clean-up work under existing and pending compacts. Enlightened public opinion coupled with studies undertaken should also result in more adequate state legislation and support for pollution abatement programs.

This in brief is the present outlook for waterways pollution control.

REFERENCES

1. Act of Feb. 15, 1893, Sec. 3, Chap. 114, 27 Stat. L. 449.
2. Act of Aug. 14, 1912, Sec. 1, Chap. 288, 37 Stat. L. 309.
3. *Report of the Special Advisory Committee on Water Pollution*, Water Resources Section, U. S. National Resources Committee, p. 48 (July, 1935).

4. *National Resources Committee—Summary of Legislation Relating to Water Resources*, 74th Congress, 1st Session, Oct. 15, 1935.

L. F. WARRICK, *Chairman*

EARNEST BOYCE

C. M. BAKER

ROY M. HARRIS

F. H. WARING

J. K. HOSKINS

Forms and Methods of Statistical Practice

Vital Statistics Section

THE Council of the Vital Statistics Section has, since the last Annual Meeting, referred to this committee two problems for investigation:

1. Formulating a standard procedure for interchange of provisional vital statistics between cities at the end of the year, to replace the present multiplicity of questionnaires
2. Revision of the Rules for Statistical Practice adopted by the Section some years ago, mainly at the 1908 and 1910 meetings

The committee held a meeting at Washington, D. C., August 2, 1938, to discuss both these subjects. Subsequently a letter and questionnaire were sent to the health officers of cities of 250,000 population and over, requesting suggestions and criticisms of a proposed standard report form. The response was very satisfactory. Twenty-six of the 36 city health officers replied, including those from the 14 largest cities and approximately half of the others. Following is a brief abstract of the questions and of the replies received:

Question 1. *Do you use or need provisional vital statistics data (births and deaths) from other cities before appearance of the printed reports?*

Twenty of the 26 health officers answering replied affirmatively, and only 2 in the negative. An even larger number agreed to use the standard report form, if adopted. Dr. Henry F. Vaughan of Detroit, and others, stressed the need of residence allocation at some length.

Dr. Philip Marks of Pittsburgh wrote: "The Department feels keenly the need of some standardization and will be most willing to coöperate in whatever plan is worked out by this committee."

Dr. George V. Truss of Birmingham, Ala., wrote: "The effort of the committee . . . will eliminate, as you say, 'a multiplicity of

questionnaires and reports.' We will be pleased to coöperate in this undertaking."

Dr. F. W. Peterson of Los Angeles stated that 35.5 per cent of the infant deaths of that city are nonresident, and about 22 per cent of the births and total deaths.

Dr. Adolph Weinzirol of Portland, Oregon, wrote: "If you succeed in working this problem out, I am sure that all city health officers will be most grateful to you."

Question 2. *Please indicate whether the list of statistics shown on the attached form would be satisfactory for your purpose.*

In response to this question, various helpful suggestions were received, most of which have been incorporated in the model form accompanying this report.

Question 3. (a) *What estimated population are you now using? Total White Colored*

The purpose of this question was to determine whether it would not be possible to correct the misleading practice of comparing crude death rates of northern and southern cities, which differ widely as to color composition.

Question 3. (b) *Do you separate by color in your monthly tabulations of births and deaths so that provisional annual data by color could be made up from this source?*

All of the 26 cities except 3 replied that they routinely separated by color, and of these 3 (Philadelphia, Milwaukee, and Denver) only Philadelphia has more than 5 per cent colored.

Question 4. (a) *Do you receive from your State Health Department reports of your residents' born or dying in other parts of the state, or in other states?*

Only 7 of the 26 replying stated that they received such nonresident death reports from their State Health Departments; namely, New York City, Detroit, St. Louis, Baltimore,

MODEL FORM

Prepared by Committee on Forms and Methods of Statistical Practice, Vital Statistics
Section—American Public Health Association

Approved October 27, 1938, at Kansas City

Provisional Vital Statistics. City of _____, Year Ending Dec. 31, 19....
Corrected for residence: (a) Within State; (b) Interstate; (c) Not corrected
Estimated mid-year population, July 1, 19.... Total White Colored

Cause of Death with 1929 International List Number	Number of Deaths					
	Total	White	Colored			
All causes ^a						
Typhoid fever (1)						
Smallpox (6)						
Measles (7)						
Scarlet fever (8)						
Whooping cough (9)						
Diphtheria (10)						
Influenza (11)						
Poliomyelitis (16)						
Epidemic or lethargic encephalitis (17)						
Epidemic cerebrospinal meningitis (18)						
Pulmonary tuberculosis (23)						
Other forms of tuberculosis (24-32)						
Syphilis (34)						
Malaria (38)						
Rocky Mountain spotted fever (44c)						
Cancer, all forms (45-53)						
Diabetes mellitus (59)						
Pellagra (62)						
Progressive locomotor ataxia (80)						
Cerebral hem., emb., and throm. (82a, b)						
General paralysis of the insane (83)						
Diseases of the heart (90-95)						
Other circulatory diseases (96-103)						
Pneumonia, all forms (107-109)						
Diarrhea and enteritis under age 2 (119)						
Appendicitis (121)						
Nephritis, all forms (130-132)						
Diseases of puerperal state (140-150)						
Suicide (163-171)						
Homicide (172-175)						
All accidents (176-195) (201-214)						
Motor vehicle accidents (206, 208, 210, 211)						
Live Births ^a						
Stillbirths ^b						
Deaths under one year ^a						
Deaths under one month ^a						

^a Exclusive of stillbirths. ^b Minimum uterogestation included in stillbirths weeks.

Submitted by Title Date

Boston (from town clerks), Milwaukee, and Jersey City. Washington, D. C., receives reports from other states. Los Angeles, Birmingham, and possibly other cities are able to

make corrections within the county, thus eliminating a large part of the nonresident error. The great majority of the cities, however, do not receive the data necessary to

make residence-corrected tables with reasonable promptness.

Question 4. (b) *In which form are the nonresident records received?*

Seven cities receive transcripts and one (Detroit) photostatic copies of certificates. In Texas, New York, and apparently in other states, the cities receive residence-corrected tables when the final reports are issued by the State Health Department.

Question 4. (c) *Are the nonresident data received monthly, quarterly, or annually.*

In 6 cases the transcripts are received monthly; in 1 (Washington, D. C.) at irregular intervals; in the majority, not at all.

Question 4. (d) *Approximately when were nonresident data received for births and deaths of last December?*

Two cities, Milwaukee and Baltimore, received the data by the 10th of January; 3 in February; and 2 in March or later.

Question 4. (e) *If you now publish any tables corrected for residence, please describe or send specimens.*

Publication practice varies. A few cities apparently make only a one-way correction; that is, nonresident deaths occurring locally are deducted, but deaths of city residents occurring elsewhere are not added in.

Question 5. (a) *If a standard form for reporting provisional vital statistics is adopted, would you be willing to make up a table in such form, beginning in 1939? Monthly Quarterly Annually*

All of the cities replying indicated a willingness to make up provisional annual tables in the accepted standard form; but only half felt that quarterly or monthly reports were justified. Cleveland, Ohio, doubted the utility of *provisional* reports; and New York City advocated the distribution of final reports by cities, in addition to provisional, in order to promote more accurate comparisons.

Question 5. (b) *Would you favor publication of such data by governmental agencies, such as the Public*

Health Service or the Bureau of the Census?

Twenty-three of the 26 replying answered in the affirmative.

Question 5. (c) *Would you consider it desirable to distribute copies of the preliminary annual table to, say, the 30 largest cities as soon as the report is completed?*

Twenty-two answered in the affirmative. Some recommended that the reports be sent to the state health departments as well as to other cities.

RECOMMENDATIONS

In the light of the expressed desires of the city health officers consulted, your committee recommends:

1. That the proposed standard form for reporting provisional vital statistics, which is attached hereto as Exhibit 1, be adopted as standard by federal, state, and city health departments in requesting or preparing provisional vital statistics reports for cities.

2. That, in so far as is possible, state health departments provide cities with copies of nonresident records, preferably as transcripts, as soon after the close of each month as is practicable.

3. That all cities indicate on vital statistics tables whether the data are residence-corrected, residence correction being defined as including the necessary additive as well as deductive corrections. The committee recommends against the one-way correction; that is, against deductions without offsetting additions.

4. That published tables be color specific except where the proportion of non-whites is appreciably less than 5 per cent; and that the practice be avoided of comparing rates for northern and southern areas without color separation.

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Residence Allocation

Vital Statistics Section

IN 1931 the Vital Statistics Section adopted a resolution requesting the U. S. Bureau of the Census to act as a clearing agency in an interstate transfer of copies of death certificates of nonresidents. The Bureau most willingly undertook this function, extending it the next year to include the transfer of copies of birth certificates. Within a very short time the interchange became practically country-wide; now only one state still remains outside this coöperative undertaking.

Several months ago the committee addressed a questionnaire to the registrars of all states and territories and the Dominion of Canada for the purpose of ascertaining:

1. How many states allocate births and deaths to place of residence, and what criteria are used in this allocation.

2. On what basis are the certificates of deaths of nonresidents selected for the interchange among states.

3. How promptly are transcripts sent to the Bureau of the Census.

4. What use is made by the states of the transcripts received from the Bureau of the Census.

5. What are the main difficulties encountered in connection with residence allocation.

The comprehensive replies from 34 states and the District of Columbia may be summarized as follows:

Birth and death records are allocated to some extent by most but not all of these states. In 7 states a nonresident is considered as a person who resided in a given area less than 1 year. The remaining states employ no time limit and use as a basis for the determination of residence the definition of the Bureau

of the Census, namely, "the usual place of abode."

The exceptions to these procedures relate principally to the following 4 types of death:

1. Deaths in custodial institutions—The Bureau of the Census considers the institution as the residence of its inmates, and in residence allocation includes the institutional deaths with those of the community in which the institution is located. Only 2 states follow this procedure; 5 states, while considering the institution the place of residence, keep the statistics of institutional mortality separate from those of the general population. Seventeen states allocate the institutional deaths to place of residence on admission, while 3 states allocate the deaths to whatever place is given on the certificate as the residence—the institution or the place of residence prior to admission.

2. Deaths of infants under 1 year—Most states allocate these deaths to the residence of the mother as given on the death certificate, but 3 states allocate them to the residence of the mother at the time the birth occurred, i.e., to the place of residence as given on the birth certificate, and 2 to the place in which the birth was recorded.

3. Deaths from infectious diseases—The majority of states from which replies were received (18) allocate all deaths from infectious diseases to the place of usual residence, while 8 states allocate the deaths to the place where the disease originated if that fact can be determined.

4. Accidents—Five states allocate these deaths to place of residence; 7 to place of occurrence of the accident; 14 allocate the deaths both ways, making supplemental tabulations to show one or the other set of data.

Practically all states forward to the Bureau of the Census transcripts of all birth and death records on which the residence is given as "out of the State."

Most of the states are, however,

rather dilatory in forwarding the transcripts to the Bureau. At the time the committee's questionnaire was answered only 11 states had sent transcripts within 2 months after the receipt of the originals in the state office. In other words, by the end of June, these states had forwarded transcripts through the month of April. The latest transcripts sent by 8 states were for the month of March; in 11 states the transcripts were more than 3 months old; while 4 states had as yet sent no transcripts for the year 1938.

Of the 24 states which regularly tabulate resident figures, only 12 utilize the transcripts received through the Bureau of the Census from other states, while 2 states employ these transcripts for supplemental tabulations.

Ten states employ the transcripts for purposes other than residence tabulations. In most of these states the transcripts are consulted when a request for information discloses the fact that the required birth and death record is not on file in the state office. In one state the transcripts are used in the follow-up of cancer deaths; in another they are consulted by the inheritance tax section of the department of revenue, and in still another they are referred to by the motor vehicle bureau.

All of the replies received by the committee except one, from the state at present not coöperating, expressed full approval of the principle of the interstate exchange of transcripts of birth and death certificates. They all, either directly or by implication, indicated that the interchange was neither burdensome nor unproductive. It was felt generally, however, that to make the interchange of the utmost mutual benefit it was essential for all states to participate in it and that the transcripts be forwarded to the Bureau of the Census as promptly as possible. A number of states which at present make no use of these transcripts, informed

the committee that they would include them in their residence tabulations if they were received by April 1 following the year to which they relate.

Only one territory, Hawaii, replied to the questionnaire. Births and deaths occurring in the territory are allocated to place of residence, in general according to usual place of abode. Arrangement has recently been made with the U. S. Bureau of the Census for the interchange of nonresident transcripts, but it is doubtful if many certificates will be exchanged.

The Vital Statistics Branch of the Canadian Bureau of Statistics also allocates all births and deaths occurring within the dominion to place of residence.* The definition of residence employed is the usual place of abode, the only exception being for deaths in institutions for the insane, feeble-minded, and epileptic, which are transferred to the place of residence prior to admission wherever that can be obtained. The Dominion has entered into an agreement with the U. S. Bureau of the Census for an annual confidential exchange of transcripts of birth and death certificates of residents of the United States dying in Canada and residents of Canada dying in the United States, in order that each country might see how much its mortality rates are affected by such interchange.

To make possible a consistent allocation according to residence, it was felt that the items on the birth and death certificates relating to residence should be clarified in order to avoid the following common sources of confusion:

1. The residence as now given is usually the post office address, which is frequently different from the district of residence.
2. The expression "length of residence in place where death occurred" is frequently

* The American members of the committee wish to call attention to the excellent "Special Report on Deaths in Canada Classified According to Residence of Decedents, 1935," Ottawa, 1938.

confused with the length of residence in the place of usual abode.

3. It is impossible to ascertain the former residence of inmates of custodial institutions when the certificate clearly asks for usual place of abode, which is the institution.

The considered study of the problem of residence allocation leads the committee to make the following recommendations:

1. The items on the birth and death certificates which relate to residence should be rearranged and re-worded to eliminate ambiguity and to make possible unequivocal replies. The form of birth and death certificates used in New York State, for example, contains the question, "Is place of residence within the limits of a city or incorporated village?" The difficulty in connection with custodial institutions is resolved in the State of New Jersey by the addition, after "place of usual abode" of the statement "If an institution, place of residence prior to admission."

2. Interchange of transcripts of birth and death certificates should be expedited to make possible the greatest utilization of the information thus furnished to the states. Since most of the out of state births and deaths occur in adjacent states, it is possible that

some states would find it advantageous to arrange with all or some of the neighboring states for a direct interchange of transcripts of birth and death certificates of nonresidents. Such an interchange would make possible the utilization of the nonresident data in the computation of monthly rates, while the final annual tabulations could include also the transcripts from non-adjacent states routed through the Bureau of the Census. In sending transcripts to the Bureau, each state would note the number of transcripts, if any, sent directly to other states.

3. Interstate transfer should include all transcripts which will be subject to allocation according to the broadest interpretation of the term residence. While this would lead to some states receiving transcripts, which according to their rules would not be considered as those of residents, it would at the same time provide other states which employ a more general interpretation of the term, with the information they wish to have.

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